CHAPTER 4. TRANSPORT HELIPORTS

38. GENERAL. A transport heliport is available for use by the general public without a requirement for prior approval of the owner or operator and is intended to accommodate air carrier operators providing scheduled service with large helicopters. When the heliport is served by helicopters carrying more than 30 passengers, the heliport operator is required to have an FAA certificate issued under FAR Part 139, Certification and Operations: Land Airports Serving Certain Air Carriers. Because of the need for all-weather operating capability, public agencies planning a transport heliport are encouraged to select a site capable of accommodating precision instrument operations. This chapter contains standards and recommendations for designing a transport heliport. Figure 4-1 illustrates the essential features of a transport heliport.

NOTE: *If operations by tilt rotor aircraft are contemplated, criteria in AC 150/5390-3, Vertiport Design is applicable.*

39. FINAL APPROACH AND TAKEOFF AREA (FATO). A transport heliport must have a FATO which may contain one or more touchdown liftoff areas-- locations within the FATO at which arriving helicopters terminate the approach and from which departing helicopters takeoff.

a. Location. The FATO of a transport heliport is normally at ground level but may be developed with the TLOF located on a pier, or when carefully planned, on the roof of a building. Figure 4-2 depicts a FATO extending over water.

b. Size. FATOs are normally rectangles with the long axis aligned with the prevailing wind. FATO width is based on the rotor diameter of the design helicopter. FATO length is based on the elevation of the heliport site above mean sea level.

(1) FATO Width. The minimum width of a FATO should be at least 2 rotor diameters of the design helicopter. A recommended FATO width of 100 feet (30 m) will accommodate the majority of large helicopters in the current fleet.

(2) FATO Length. The minimum recommended FATO length is 200 feet (60 m). For heliports at elevations of 1,000 feet (300 m) or more above mean sea level, an elongated FATO as determined from figure 4-3 is recommended. The elongation should be in the direction of takeoff. Figure 4-3 depicts recommended FATO lengths.

c. Gradients. The turf portions of a FATO should be graded to remove surface irregularities and assure drainage. Longitudinal gradients should match those of the paved touchdown and liftoff surface (TLOF). To insure drainage, a shoulder with gradients ranging between 2 and 5 percent should exist along the TLOF edge.

40. SAFETY AREA. A safety area not less than 30 foot (9 m) in width surrounds the FATO. The FATO and the safety area must be free and clear of objects such as parked helicopters, buildings, fences, etc. which could be struck by the main or tail rotor, or catch the skids, of an arriving or departing helicopter.

41. TOUCHDOWN AND LIFT-OFF AREA (TLOF). TLOFs are rectangular paved surfaces centered on the major axis of the FATO. For irregularly shaped or oversized FATOs, the center of the TLOF is located at least the rotor diameter of the design helicopter in from the FATO boundaries. Figure 4-4 illustrates this FATO/TLOF relationship.

a. Size. The minimum dimension of a the TLOF shall not be less than the rotor diameter of the design helicopter or 50 feet (15 m).

b. Surface Characteristics. A Portland Cement Concrete (PCC) surface is recommended for ground level heliports. An asphaltic surface is "less desirable" for heliports as it may rut under the wheels or skids of a parked helicopter, a possible factor in some roll-over incidents. Pavements should have a broomed or other roughened finish that provides a skid resistant surface for helicopters and non-slippery footing for persons. Pavements should be designed to support 1.5 times the maximum takeoff weight of the design helicopter.

c. Gradients. To assure drainage, the TLOF should have a maximum longitudinal gradient of 0.5 percent and a transverse gradient between 0.5 and 2.0 percent. 42. APPROACH/TAKEOFF SURFACE.

a. Approach/Takeoff Path. A transport heliport should have more than one approach/takeoff path. A path should be oriented to align with the direction of the

predominant wind during visual conditions and, to the extent practicable, an other with the prevailing winds during instrument conditions. Visual approach/takeoff paths may curve to avoid objects, noise sensitive areas, and/or utilize the airspace above public lands e.g. freeways, rivers, etc.

b. Approach/Takeoff Surface. An approach/ takeoff surface is centered on each approach/takeoff path. The visual approach/takeoff surface conforms to the dimensions of the FAR Part 77 heliport approach surface. Figure 1-6 illustrates the heliport approach and transitional surfaces which must be free of hazards to air navigation. Paragraph 8 provides guidance on how to identify and mitigate hazards to air navigation. The approach/takeoff surface centered on the path aligned with the prevailing winds during instrument conditions should comply with the obstacle evaluation surfaces criteria cited in chapters 7 and 8.

43. PROTECTION ZONE. The protection zone is the property under lying the approach/takeoff surface out to where the surface is 35 feet (10.5 m) above the heliport elevation as illustrated in figure 4-5. The heliport proponent should own or control this property. The control should include the ability to clear incompatible objects and to preclude activities that contribute to the congregation of people.

44. TAXI ROUTES AND TAXIWAYS. A taxi route is both an object free right-of-way connecting the FATO to a parking area/apron, and a maneuvering aisle on the parking area/apron. Taxiways are paved surfaces, normally centered in a taxi route, used by helicopters in ground maneuvering. The relationship between taxi routes and paved taxiways is illustrated in figure 4-6.

a. Widths.

(1) Taxi Routes. The width of a taxi route is determined by adding the clearance specified in "b" below to the maximum rotor diameter of the helicopter that will hover or ground taxi.

(2) Taxiways. The width of paved taxiway should be at least twice the undercarriage width of the design helicopter.

b. Clearances. Taxi routes and taxiways should provide the design helicopter with 20 feet (6 m) of rotor tip clearance for hover taxiing and 10 feet (3 m) clearance for ground taxiing.

c. Surfaces. Unpaved portions of taxi routes should have a turf cover, or be treated in some manner, to prevent dirt and debris from being raised by a taxiing helicopter's rotor wash. Taxiways may have an asphaltic, portland cement, or other stabilized surface. Taxiway pavements should be capable of sustaining the maximum gross weight of the design helicopter under all weather conditions.

d. Gradients. Taxiway longitudinal gradients should not exceed 2.0 percent. Transverse gradients should not be less than 0.5 percent nor greater than 2.0 percent.

45. HELICOPTER PARKING. A transport heliport should have a paved apron for parking helicopters. The size of the apron depends upon the number of helicopters to be accommodated. Separate aprons may be established for specific functions such as passenger boarding, maintenance, and parking of based and transient helicopters. Parking positions should be designed to accommodate the range of helicopter sizes expected at the facility.

a. Size. Parking position size is dependent upon the helicopter size and the intended paths in maneuvering in and out of the parking position. There should be at least 1/3 rotor, but not less than 10 feet (3 m), of clearance between skid equipped helicopters and at least 10 feet (3 m) for wheel equipped helicopters to another helicopter or object. Clearances are measured from any part of a helicopter with the helicopter on the intended path. Tail rotor clearance may become the critical clearance when the helicopter turns 30 degree or more within a parking position. Figure 4-7 illustrates this design principle.

b. Fueling. AC 150/5230-4, Aircraft Fuel Storage, Handling, and Dispensing on Airports, contains guidance on fueling services. Systems for storing and dispensing fuel must conform to federal, state, and local requirements for petroleum handling facilities. Guidance is found in AC 150/5230-4, Aircraft Fuel Storage, Handling, and Dispensing on Airports, and appropriate National Fire Protection Association (NFPA) publications. Fueling locations should be designed and marked to minimize the potential for helicopters to collide with the dispensing equipment. The area should be lighted if night fueling operations are contemplated.

c. Additional Apron. Additional area may be required adjacent to hangars used by private helicopter owners and for hangars and other structures used by fixed base operators.

d. Tie Downs. Recessed tie downs may be installed to accommodate extended or over night parking of based or transient helicopters. Guidance on recessed tie downs recommended for extended or overnight parking is found in AC 20-35, Tiedown Sense.

46. HELIPORT MARKERS AND MARKINGS. Markers and/or surface markings identify the facility as a heliport, the perimeter of the FATO and TLOF, any taxi route, taxiway, and/or parking positions. Surface markings/lines may be paint or preformed material. Heliport FATOs and TLOFs are defined with in-ground markers and/or white lines. Taxi routes are defined with raised edge markers. Taxiways and aprons are defined with yellow lines/markings. Lines/markings may be outlined with a 6 inch (15 cm) wide stripe of a contrasting color to enhance conspicuity.

a. Perimeter Markings. The perimeter of the FATO and/or TLOF should be defined with markers and/or lines. Figure 4-8 illustrates a heliport with in-ground markers and surface markings while figure 4-9 illustrates a heliport with surface markings.

(1) Unpaved FATOs. The perimeter of an unpaved FATO is defined with in-ground markers, approximately 1 foot by 5 foot (30 cm by 1.5 m) located at the corners and along the FATO edges.

(2) Paved FATOs. A 1 foot (30 cm) wide dashed white line defines the FATO perimeter. The segments and separation between segments should be even. The corners must be defined and the edge segments should be approximately 5 feet (1.5 m) in length.

(3) TLOFs. A continuous 12 inch (30 cm) wide solid white line defines the perimeter of a paved or a hard surfaced TLOF.

b. Identification Marking. Transport heliports are identified by the white capital letter H centered on the TLOF as illustrated in figures 4-8 and 4-9. The H is oriented on the axis of the dominate approach/takeoff path. Appendix 2 contains dimension recommendations.

c. Closed Heliport. All markings of a permanently closed heliport, FATO, or TLOF should be obliterated. If it is impracticable to obliterate markings, a yellow X, as illustrated in figure 4-10, should be placed over the H. The yellow X must be large enough to ensure early pilot recognition that the heliport is closed.

d. Taxi Routes and Taxiway Markings. Taxi route edges are defined with yellow-blue-yellow raised markers that are not more than 8 inches (20 cm) in height nor less than 4 inches (10 cm) in diameter. Taxiway centerlines and edges are marked with lines. The centerline is a continuous 6 inch (15 cm) wide yellow line. The edges are defined with two continuous 6 inch (15 cm) wide yellow lines spaced 6 inches (15 cm) apart. Figure 4-6 illustrates taxi route and taxiway centerline and edge markings.

e. Apron Markings. In addition to the taxiway and parking position markings, the yellow (double) taxiway edge lines continue around the apron to define the apron edge. Figure 4-7 illustrates apron markings.

f. Parking Position Markings. The yellow taxiway centerline continues into the individual parking positions to define the centerline of the parking positions. A parking position is further identified by a 12 inch (30 cm) wide yellow line defining a circle. The diameter of the circle is equal to the rotor diameter of the largest helicopter the position is designed to accommodate. The spacing between circles, and a circle and an object depends upon how much the helicopter must turn to exit the position. Refer to paragraph 45.a.

47. HELIPORT LIGHTING. For night operations, the TLOF and taxiways (or taxi routes) need to be lighted. Yellow lights define the limits of the TLOF. Green lights define taxi route and taxiway centerlines. Alternatively, blue lights may be used to define taxiway and taxi route edges. Figure 4-11 illustrates these lighting systems. AC 150/5340-19, Taxiway Centerline Lighting System, AC 150/5340-24, Runway and Taxiway Edge Lighting System, and AC 150/5345-46, Specification for Runway and Taxiway Light Fixtures, contain technical guidance on lighting equipment and installation details.

a. Perimeter Lights. A minimum of 5 lights are recommended per side or end of the TLOF. A light is located at each corner with additional lights uniformly spaced between the corner lights with a maximum interval of 25 feet (7.5 m) between lights. Flush lights may be located on, or within 1 foot (3 cm) of, the TLOF edge. Raised light fixtures, modified to be no more than 8 inches (20 cm) in height, may be located 10 feet (3 m) out from the TLOF edge and should not penetrate a horizontal plane at the TLOF's elevation by more than 2 inches (5 cm).

b. Landing Direction Lights. An optional feature, landing direction lights, is a configuration of five L-861 lights fitted with omni-directional yellow lenses. The lights are spaced at 15 foot (4.5 m) intervals beginning at the line of perimeter lights and extending

outward in the direction of the preferred approach/takeoff path as illustrated in figure 4-11.

c. Taxiways. Taxiway centerlines are defined with flush bi-directional or uni-directional green lights. Alternatively, taxiway edges may be marked with blue taxiway edge lights. Lights are spaced at 50 feet (15 m) intervals on straight sections and at 25 feet (7.5 m) intervals on curved sections with a minimum of four lights needed to define the curve. Green retro-reflective markers meeting requirements for Type II markers in AC 150/5345-39, FAA Specification L-853, Runway and Taxiway Centerline Retro-reflective Markers, may be used in lieu of the centerline lighting fixtures. Blue retro- reflective markers may be used in lieu of edge lights.

d. Heliport Identification Beacon. A heliport identification beacon is recommended to aid in locating the heliport. The beacon, flashing white/green/yellow at the rate of 30 to 45 flashes per minute, should be located on or close to the heliport. Guidance on heliport beacons is found in AC 150/5345-12, Specification for Airport and Heliport Beacon.

e. Floodlights. Floodlights may be used to illuminate the apron area. Care should be taken to place floodlights clear of the safety area, the approach/takeoff surface(s), and the heliport transitional surfaces and not interfere with pilot vision.

48. WIND DIRECTION INDICATOR. A wind sock conforming to AC 150/5345-27, Specification for Wind Cone Assemblies, is recommended to show the direction and magnitude of the wind. Wind socks must be lighted for night operations. The wind sock should be placed where it provides a true indication of surface wind and is clear of the safety area, the approach/takeoff surface(s), and the heliport transitional surfaces. The wind sock should provide the best possible color contrast to its background. When the heliport is large or located among buildings, wind direction and speed may differ significantly from one part of the heliport to another and multiple wind socks may be necessary.

49. VISUAL GLIDE PATH INDICATORS. A visual glide path indicator, such as Heliport Approach Path Indicator (HAPI), Visual Approach Slope Indicator (VASI), or Precision Approach Path Indicator (PAPI), provides pilots with visual course and descent cues. The lowest on course visual signal must provide a minimum of 1 degree of clearance over any object in the approach path that lies within 10 degrees of the approach course centerline. The optimum location of a visual glide path indicator is on the extended centerline of the approach path at a distance that brings the helicopter to a hover 3 to 8 foot (0.9 to 2.5 m) above the TLOF. Figure 4-12 illustrates visual glide path indicator clearance criteria. AC 150/5345-28, Precision Approach Path Indicator (PAPI) Systems, and AC 150/5345-52, Generic Visual Glideslope Indicators (GVGI), provide additional information.

50. TERMINAL FACILITIES. The heliport terminal requires curb side access for passengers using private autos, taxicabs, and public transit vehicles. Public waiting areas need the usual amenities and a counter for rental car services may be desirable. Passenger auto parking areas should accommodate current requirements and have the capability of being expanded to meet future requirements. Readily available public transportation may reduce the requirement for employees and service personnel auto parking spaces. The heliport terminal building or sheltered waiting area should be attractive and functional. AC 150/5360-9, Planning and Design of Airport Terminal Facilities at Non-Hub Locations, contains guidance on designing terminal facilities.

51. SAFETY CONSIDERATIONS. The following safety related features should be provided on an as needed basis.

a. Wire Marking And Lighting. Unmarked electric and telephone wires in the heliports immediate area may be difficult to see. It is recommended that, where practical, wires located within 500 feet (150 m) of the FATO, as well as those within 1/2 mile (1 km) that are beneath and up to 100 feet (30 m) to the side of an approach/takeoff path be marked to make them more conspicuous. Figure 4-13, illustrates the area of concern. Guidance on marking and lighting objects is contained in AC 70/7460-1, Obstruction Marking and Lighting.

b. Security. Ground level heliports may require their operational areas to be fenced to prevent the inadvertent or unauthorized entry of persons or vehicles. Fences should be as low as possible and located as far as possible from the FATO. Fences should not penetrate any approach/takeoff or transitional surface. Access to air side areas should be through controlled and locked gates or doors. Gates and doors should display a cautionary sign similar to that illustrated in figure 4-14.

c. Rescue and Fire Fighting Services. Rescue and fire fighting service requirements vary. Public use utility heliports should meet (NFPA) Pamphlet 418, Standards for Heliports, or (NFPA) Pamphlet 403, Aircraft Rescue Services, criteria. A fire hose cabinet or

extinguisher should be provided at each access gate and each fueling location.

d. Equipment/Object Marking. Heliport maintenance and servicing equipment as well as other objects used in airside operational areas should be made conspicuous with reflective tape, paint, or other markings. Particular attention should be given to marking objects that are hard to see in marginal visibility such as at night, in mist, or fog.

e. Passenger Walkways. Passenger movement in operational areas should be restricted to marked walkways. Figure 4-15 illustrates one marking scheme. Apron pavements should be designed so that spilled fuel does not drain onto passenger walkways or toward parked helicopters.

f. Communication and Weather Information. A UNICOM radio may be used to provide arriving helicopters with heliport and traffic advisory information but may not be used to control air traffic. The Federal Communications Commission (FCC) should be contacted for information on UNICOM licensing. An AWOS measures and automatically broadcasts current weather conditions at the heliport site. When an AWOS is installed, it should be located at least 100 feet (30 m) and not more than 700 feet (215 m) from the edge of the TLOF. Locate the AWOS to avoid heliport surfaces subject to rotor wash from helicopter operations. Guidance on AWOS systems is found in AC 150/5220-16, Automated Weather Observing Systems (AWOS) for Non- Federal Applications.

g. Winter Operations. Swirling snow raised by a landing helicopter's rotor wash can cause the pilot to loose sight of the intended landing point. Swirling snow on takeoff can hide objects which need to be avoided. The FATO and the safety area should be kept free of snow. Guidance on winter operations is found in AC 150/5200-30, Airport Winter Safety and Operations.

52. ZONING AND COMPATIBLE LAND USE. Where state statutes permit, a transport heliport sponsor is encouraged to develop and adopt the following zoning measures to ensure that the heliport will continue to be available for public use as well as to protect the community's investment in the facility.

a. Zoning to Limit Building/Object Heights. General guidance on drafting an ordinance which would limit building and object heights is contained in AC 150/5190-4, A Model Zoning Ordinance to Limit Height of Objects Around Airports. The locally developed ordinance should substitute the heliport surfaces for the airport surfaces described in model ordinance.

b. Zoning for Compatible Land Use. A zoning ordinance may be enacted, or an existing ordinance modified, to control the use of property within the heliports approach/takeoff path environment. The ordinance should restrict activities to those which are compatible with helicopter operations.

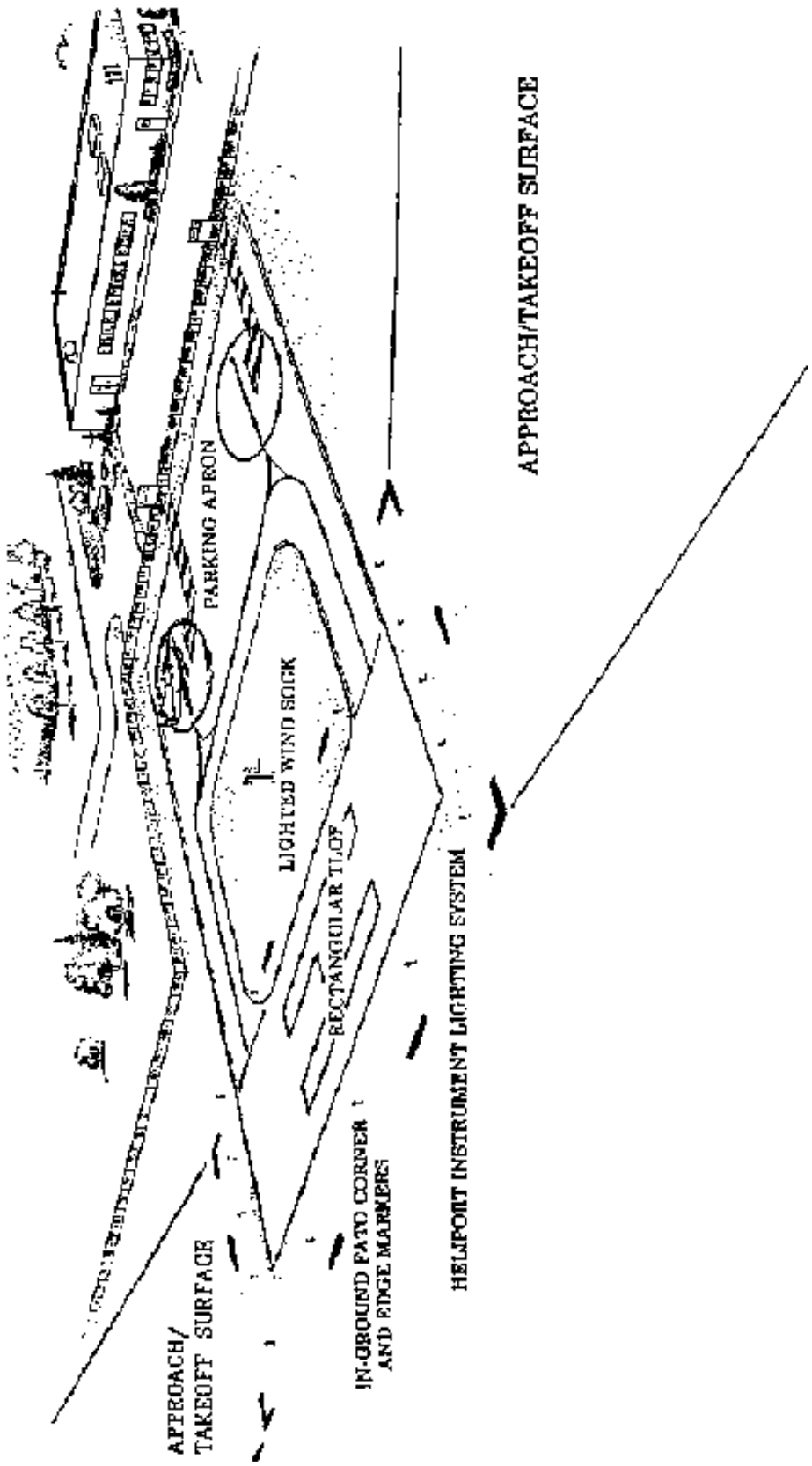


Figure 4-1. A typical transport heliport

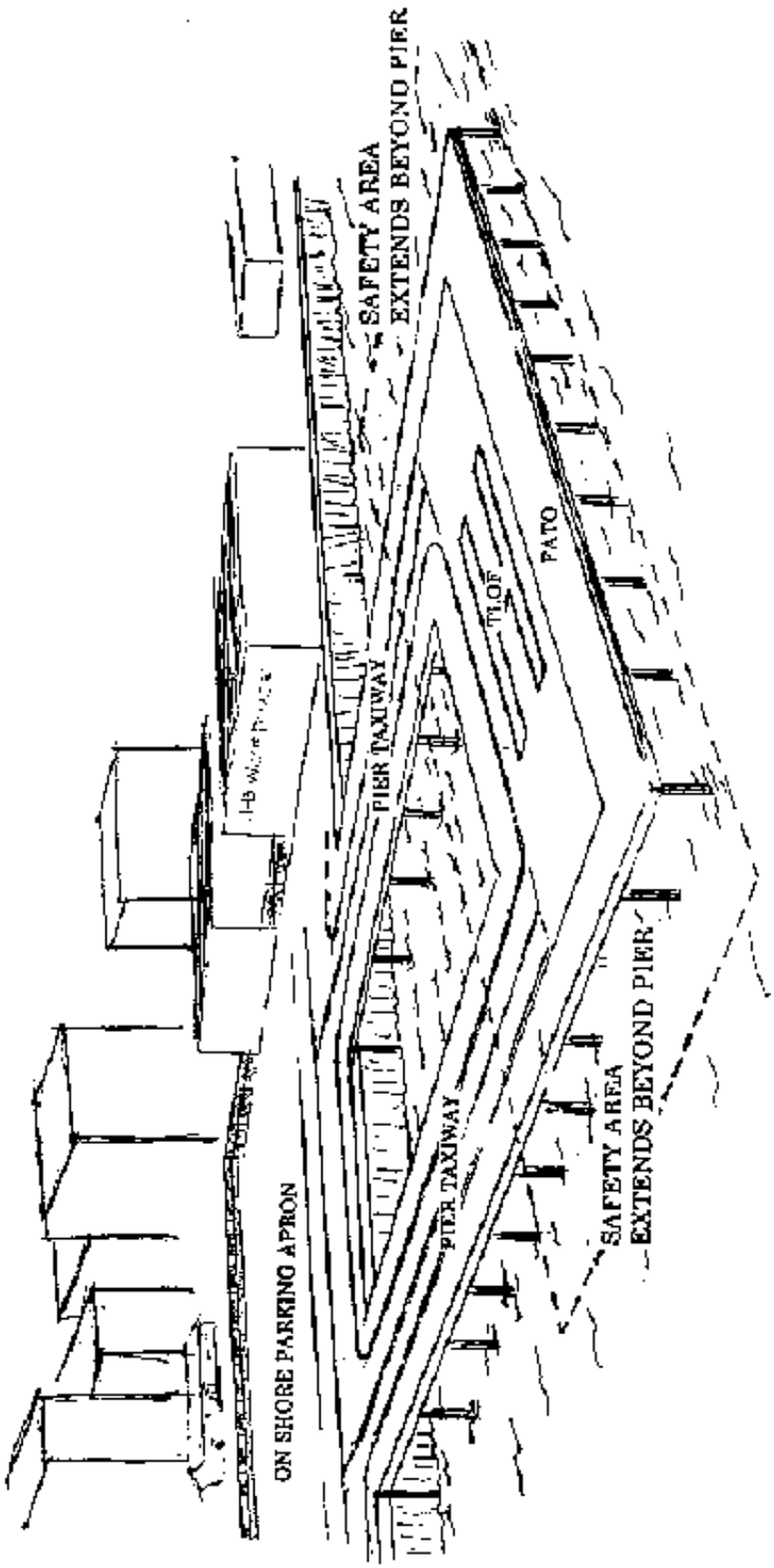


Figure 4-2. FATO extending over water

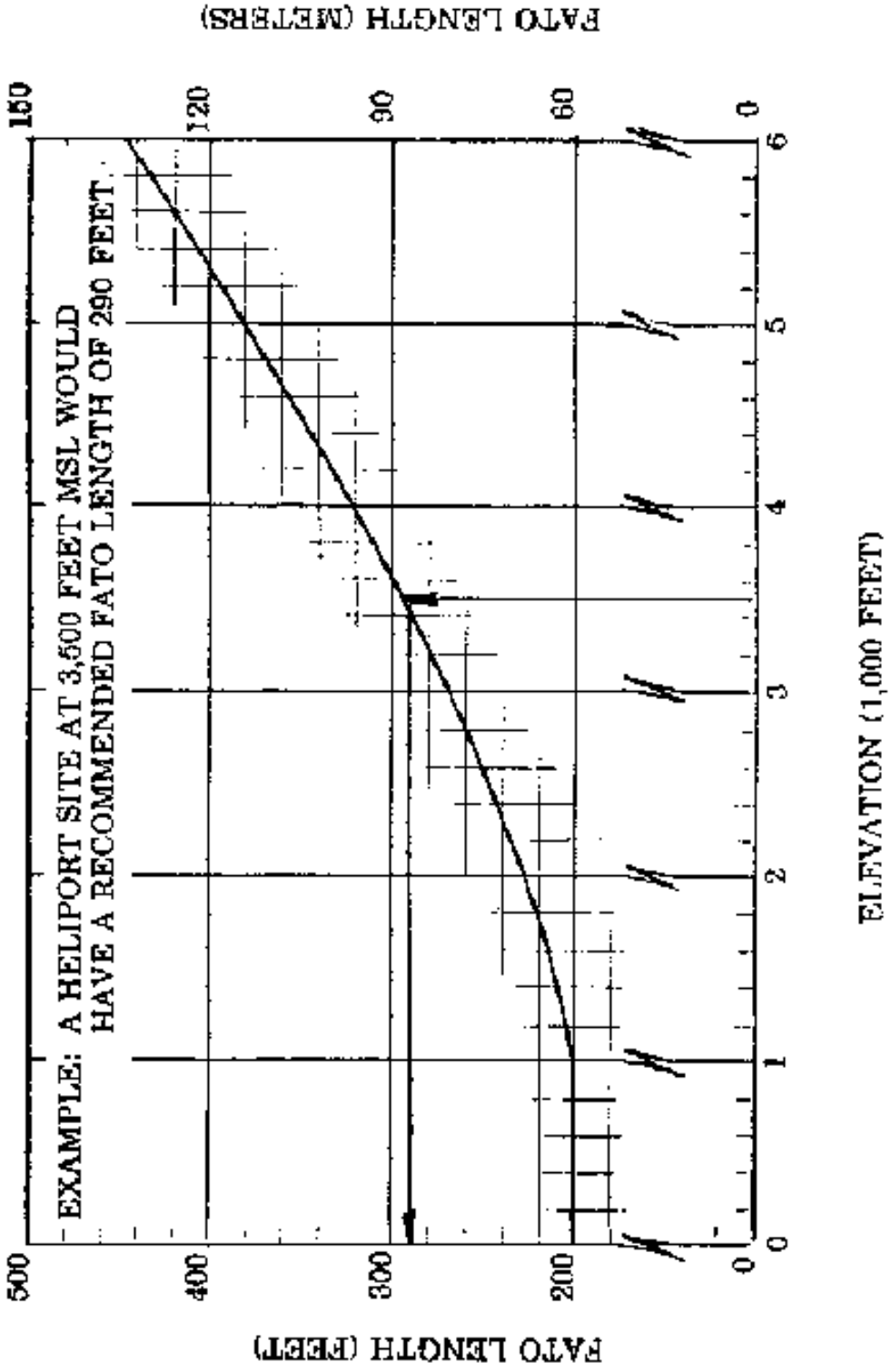


Figure 4-3. FATO length

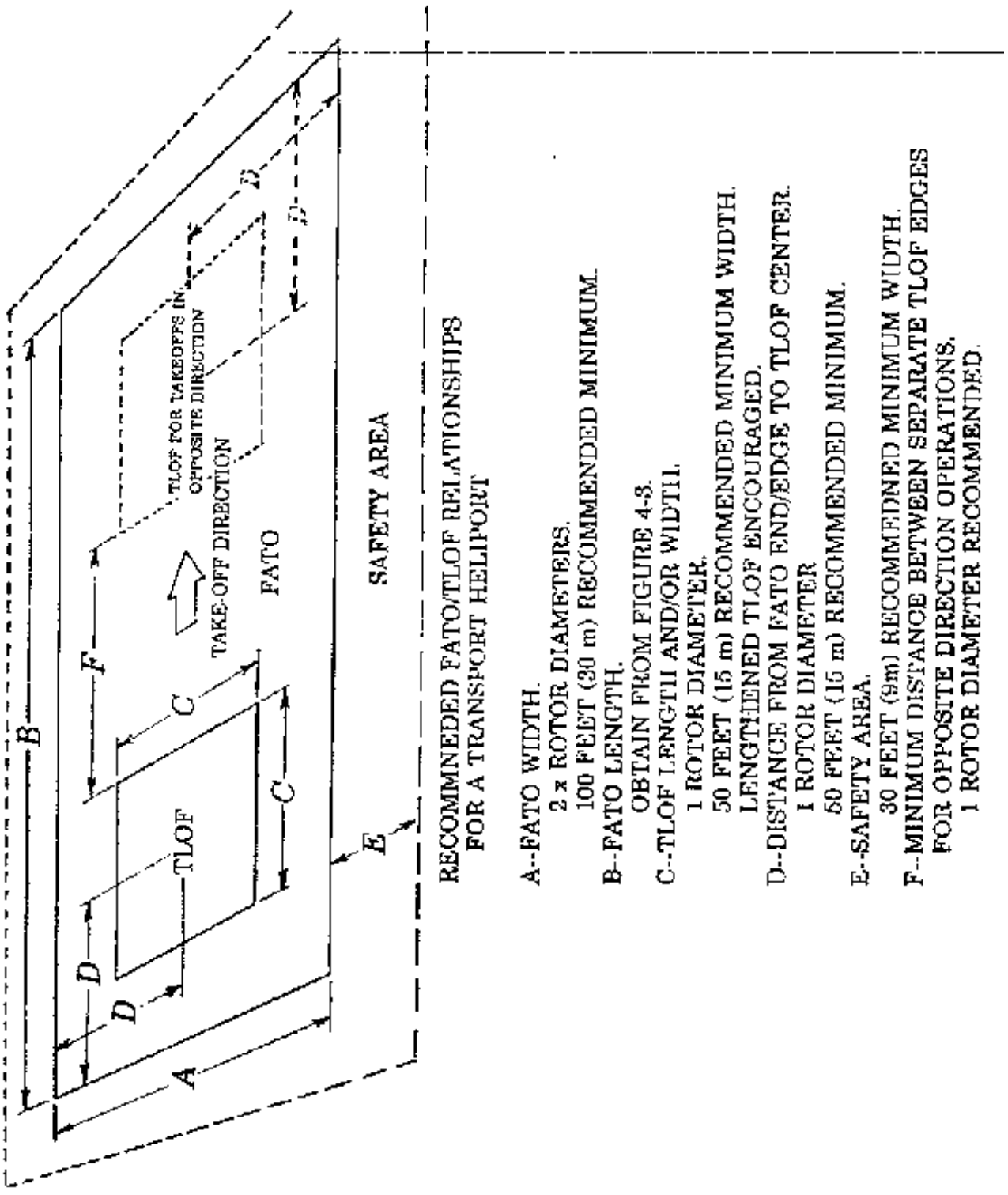


Figure 4-4. A FATO with two TLOFs

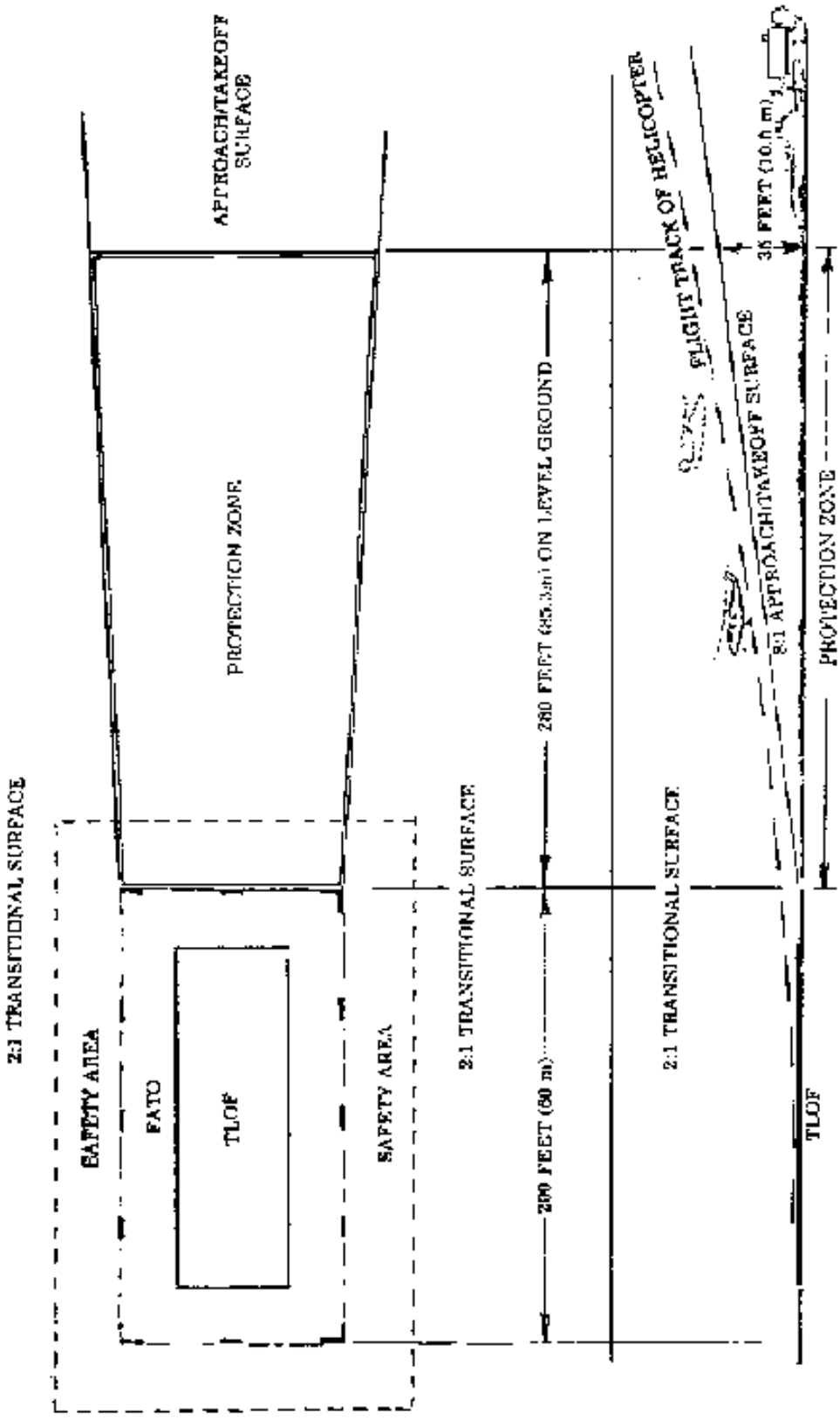


Figure 4-5. Protection zone

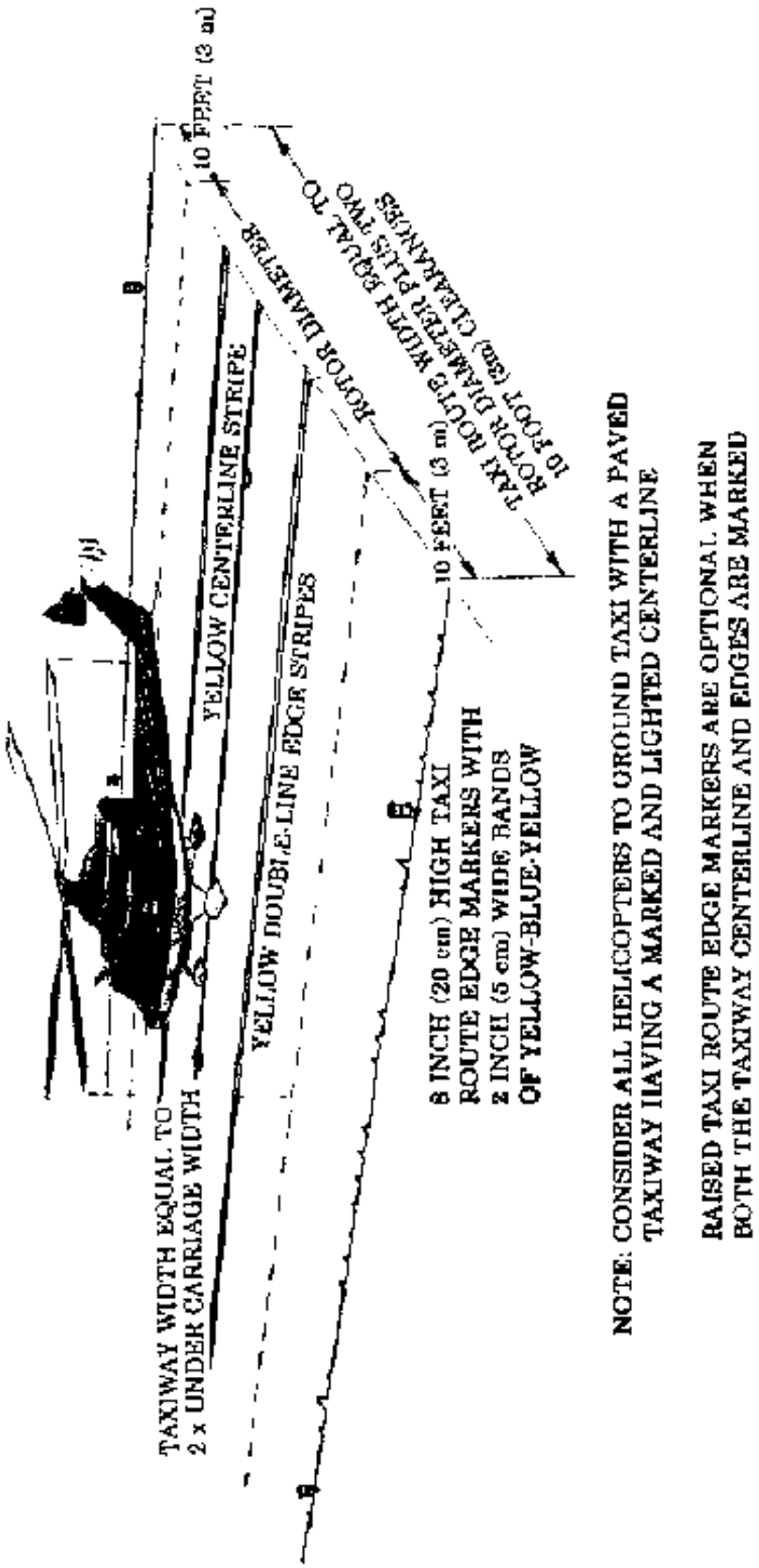


Figure 4-6. Taxi route taxiway relationship

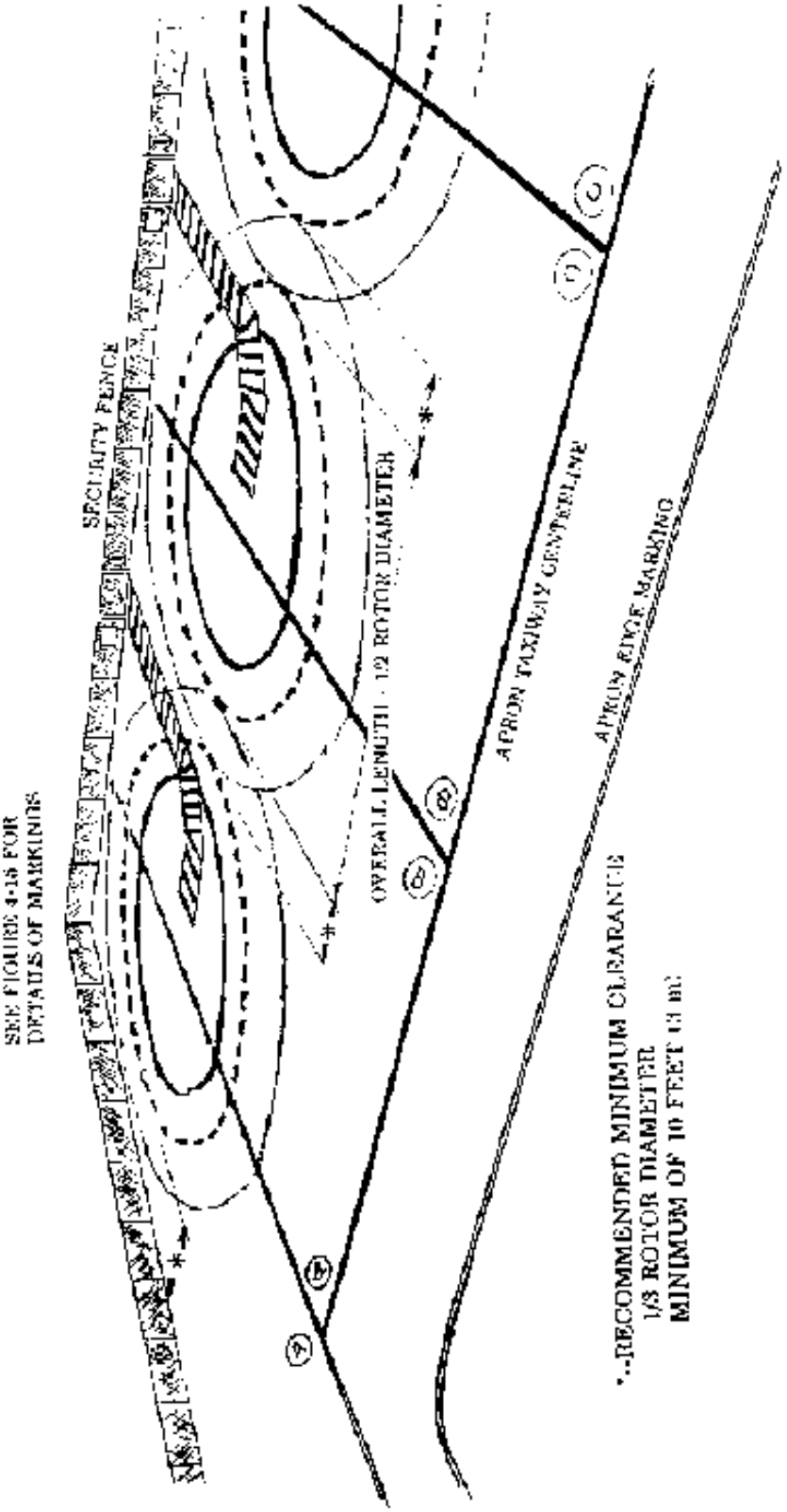


Figure 4-7. A transport heliport apron

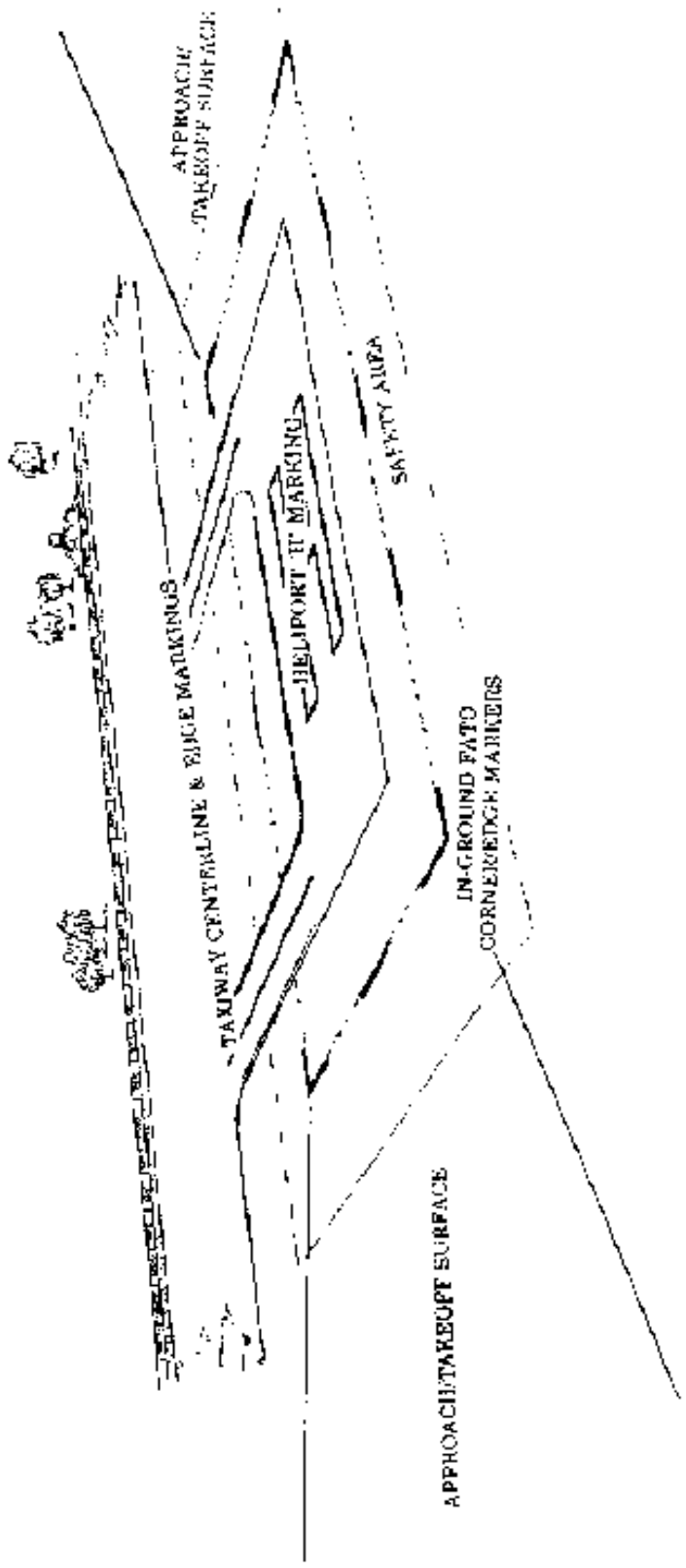


Figure 4-8. Heliport markers and markings

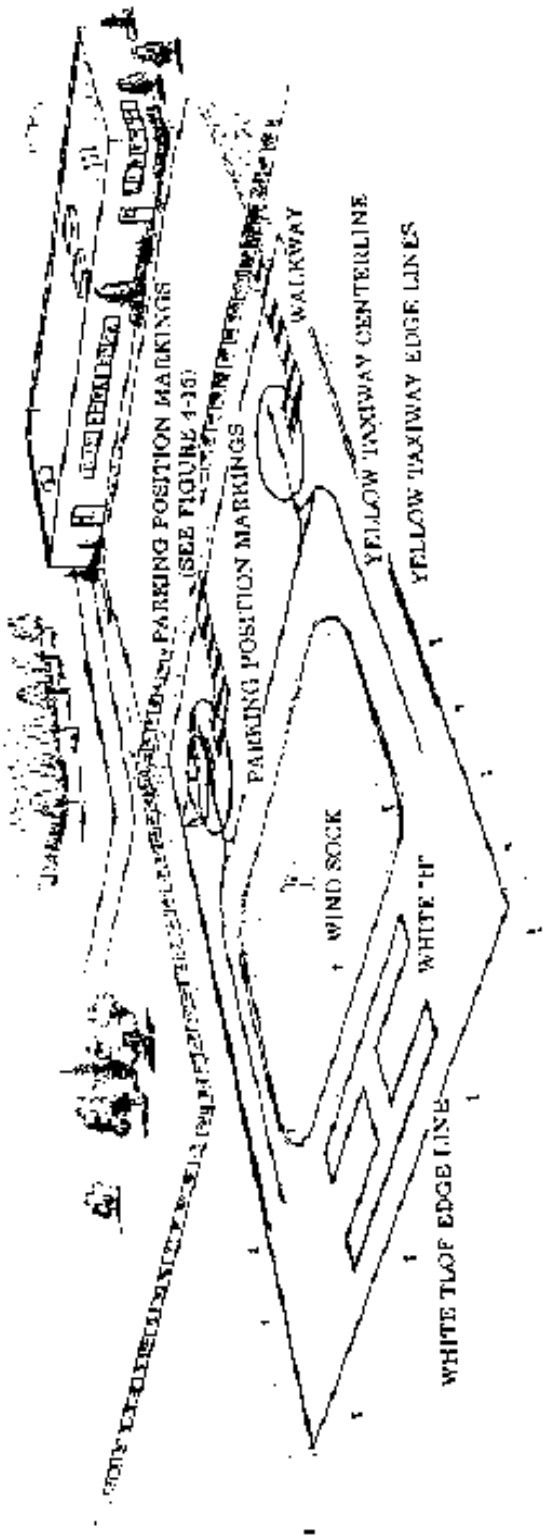


Figure 4-9. Heliport surface markings

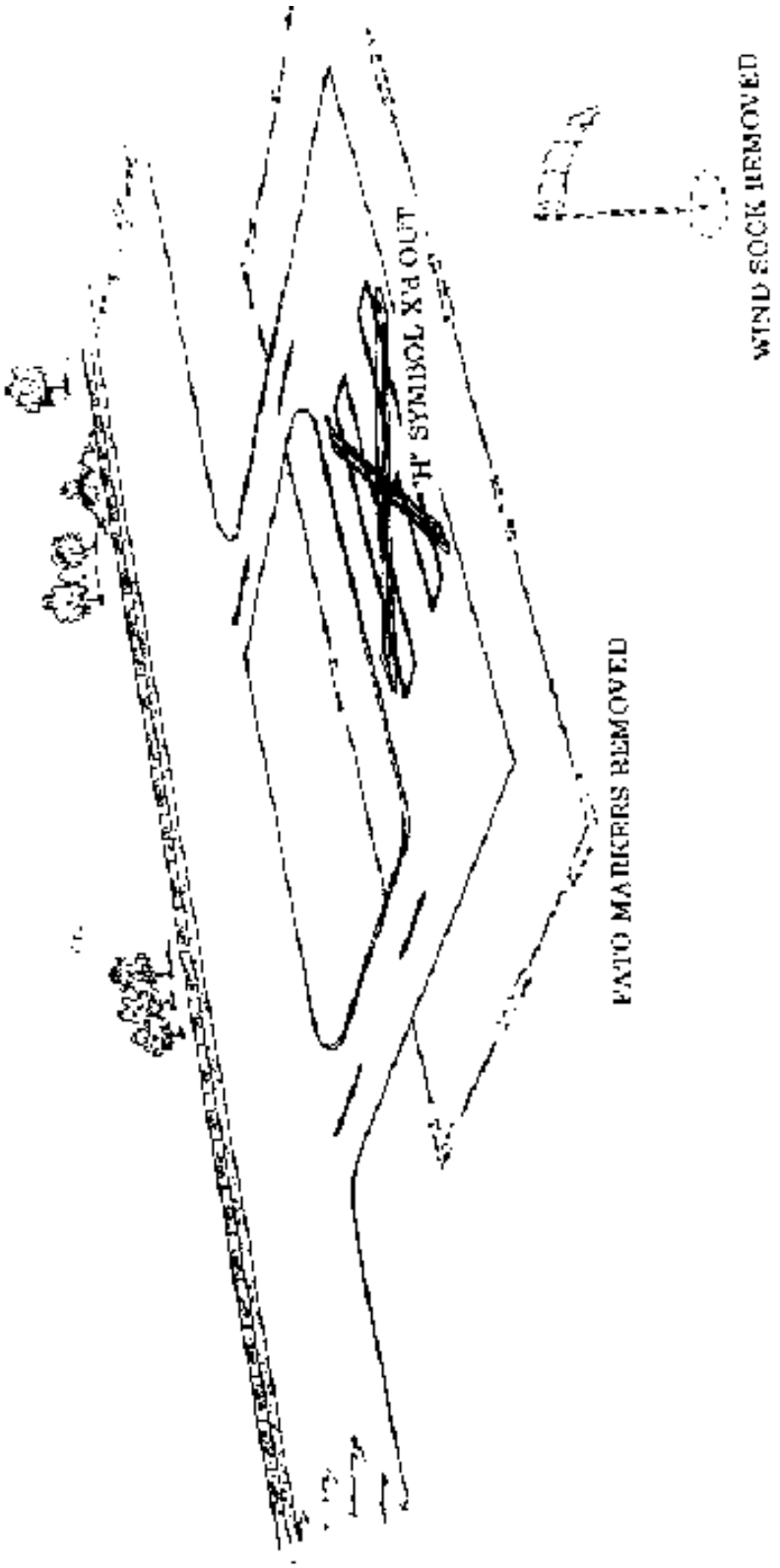


Figure 4-10. Marking a closed heliport

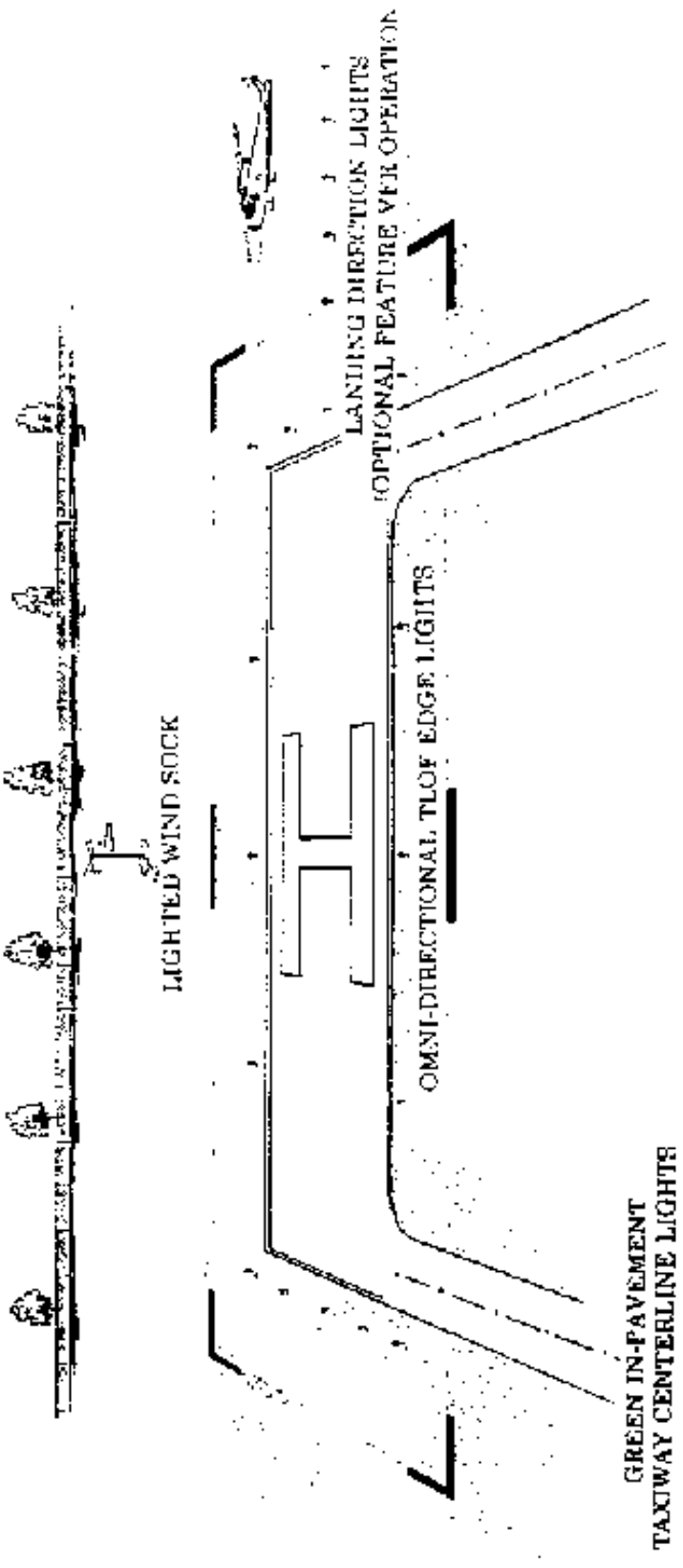


Figure 4-11. Lighting system for night operations

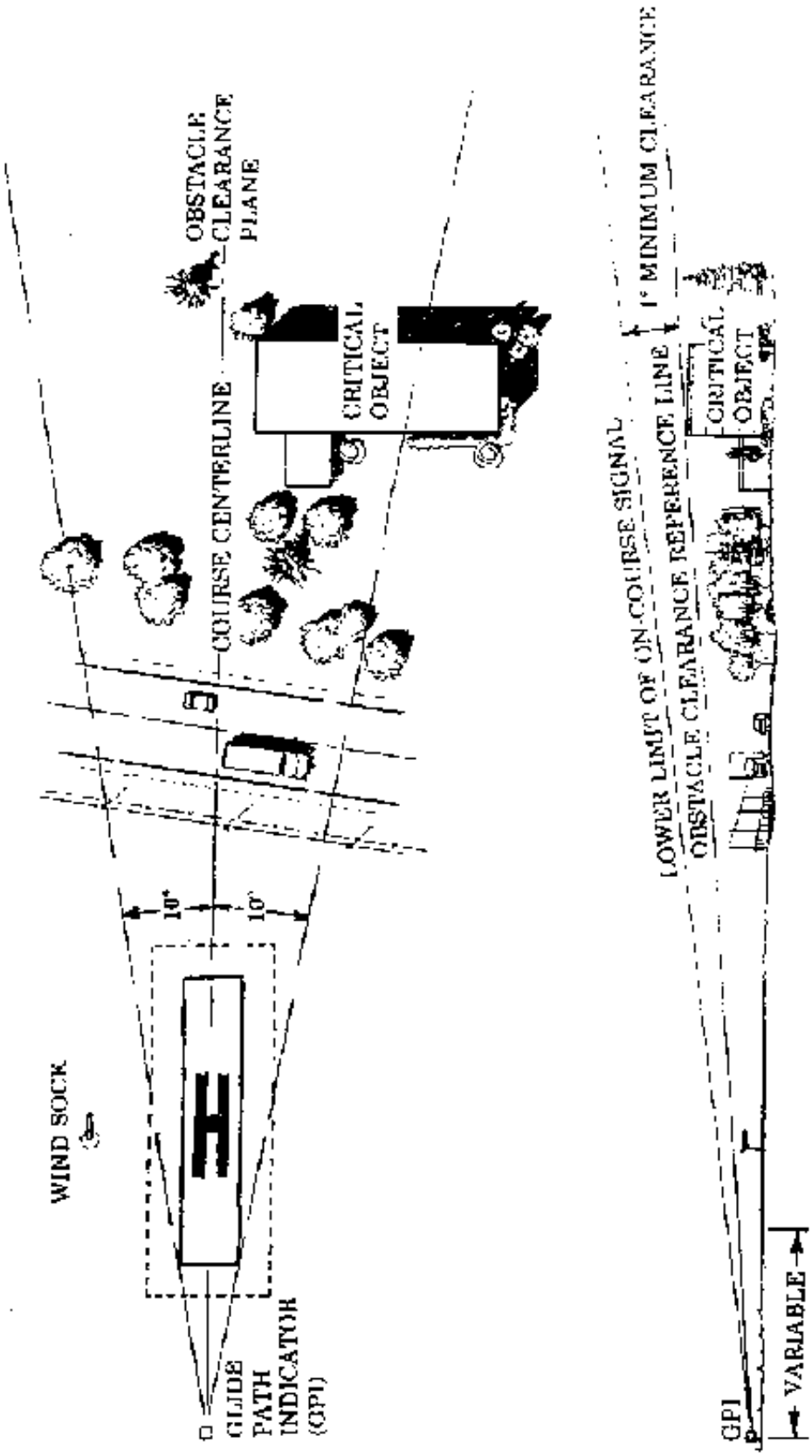


Figure 4-12. Visual glide path indicator siting and clearance criteria

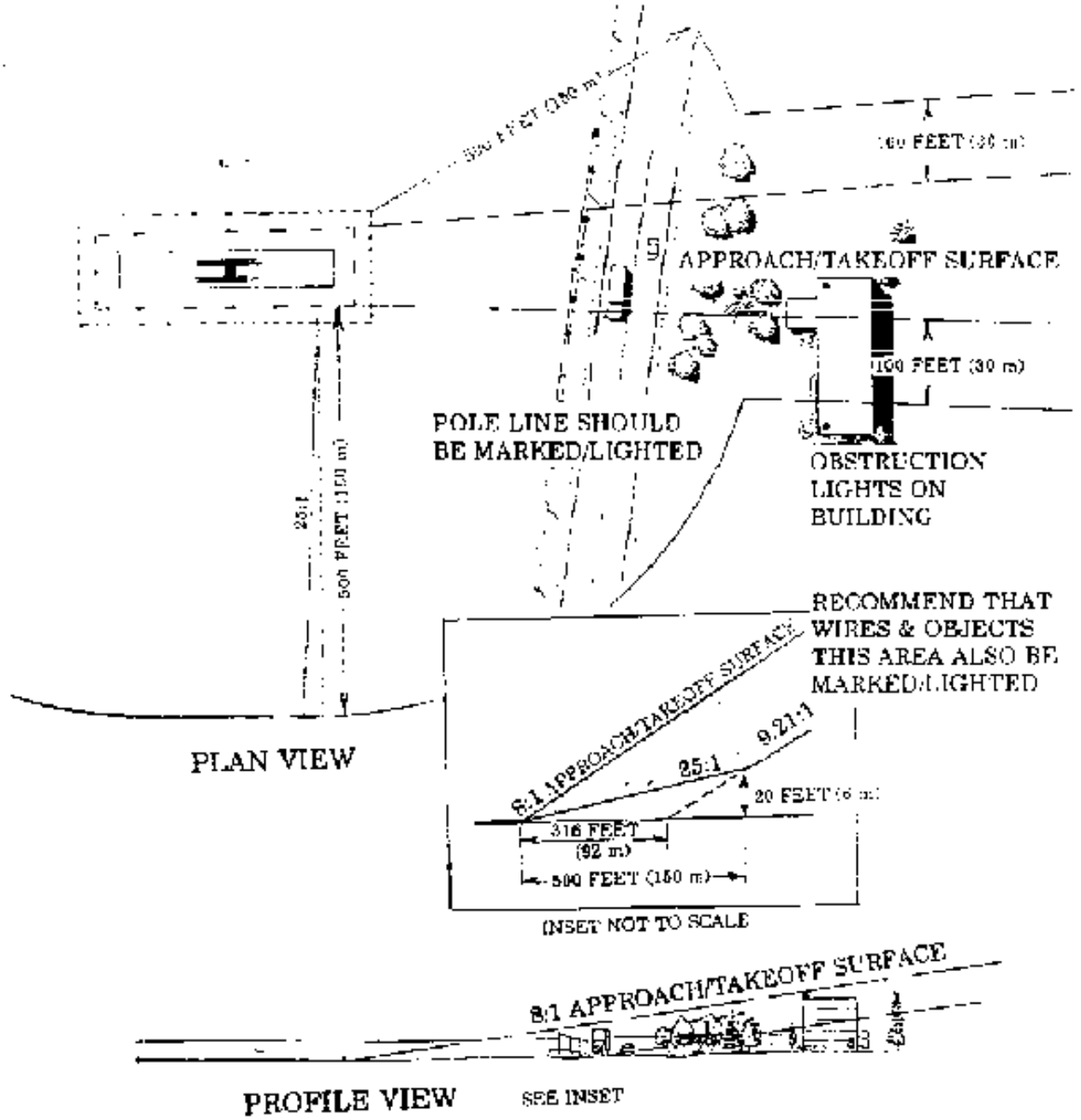


Figure 4-13. Recommended area for wire marking and/or lighting

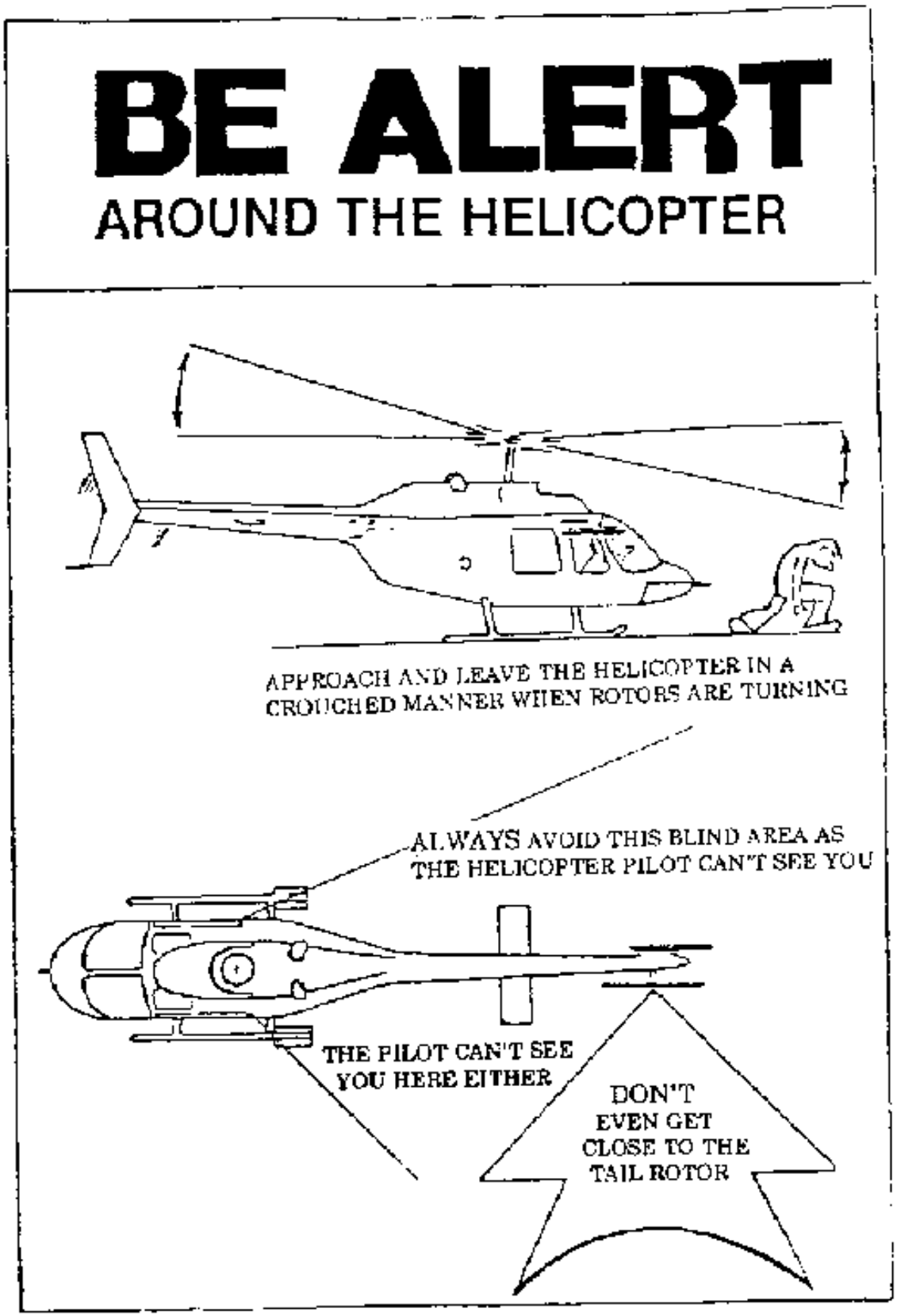


Figure 4-14. Caution sign

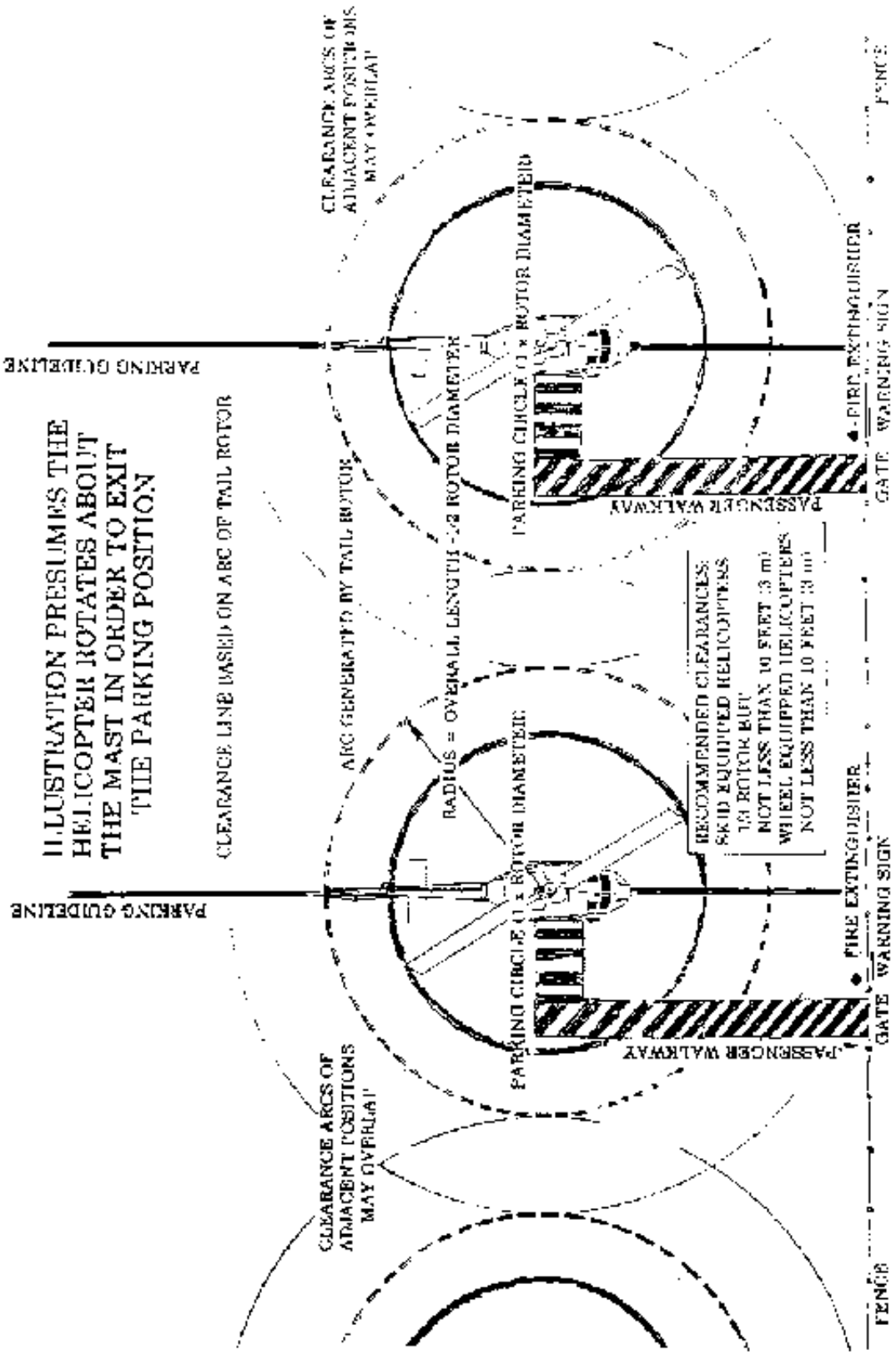


Figure 4-15. Apron parking position clearances

CHAPTER 5. HOSPITAL HELIPORTS

53. GENERAL. Helicopters have proven to be an effective means of transporting injured persons from the scene of an accident to a hospital, and in transferring patients in critical need of specialized services to another hospital having that capability. A fully functional hospital heliport may be as simple as a cleared area on the lawn together with a wind indicator (wind sock) and a clear approach/takeoff path. To the extent feasible, the approach/takeoff path should be aligned with the dominate winds. This chapter contains recommendations for hospitals to use in designing a heliport to accommodate air ambulance operations and emergency medical service personnel and equipment. Figure 5-1 illustrates the essential features of a hospital heliport.

54. FINAL APPROACH AND TAKEOFF AREA (FATO). A hospital heliport must have at least one FATO.

a. Location. The FATO may be at ground or roof top level. Objects or structures should be outside of the FATO to permit at least one clear approach/ takeoff path aligned with the prevailing winds. To avoid or minimize the need for additional ground transport, the FATO should be located to have ready access to the hospital's emergency room. Portions of the FATO of rooftop heliports may extend into the clear airspace beyond the buildings edge.

b. Size. The recommended minimum dimension of a hospital FATO is 1.5 times the overall length of the design helicopter.

c. Gradients. Gradients may range from 0.5 percent to 2.0 percent for any area on which the helicopter is expected to land. Drainage should be directed away from hospital buildings and areas occupied by people.

55. SAFETY AREA. A safety area having a width equal to 1/3 the rotor diameter of the design helicopter, but not less than 10 feet (3 m), surrounds the FATO. The FATO and the safety area should be free and clear of objects such as light poles, buildings, trees, and parked autos which could be struck by the helicopter's main or tail rotor, or catch the skids, of an arriving or departing helicopter.

56. TOUCHDOWN AND LIFT-OFF AREA (TLOF). A paved TLOF is not required. When a paved or other hard surfaced TLOF is provided, it is normally centered in the FATO. Irregularly shaped or oversized FATOs should have the center of the TLOF located at least 3/4 of the design helicopter's overall length in from the FATO boundaries. Hard surface TLOFs are recommended to provide an all-weather wearing surface for the helicopter and a firm working surface for hospital personnel and the wheeled equipment used in moving patients.

a. Size. The recommended minimum dimension of the TLOF is 40 feet (12 m).

b. Surface Characteristics. Paved TLOF surfaces should have a roughened finish that will provide a skid resistant surface for helicopters and non-slippery footing for hospital personnel. The TLOF should be constructed to support the 1.5 times the weight of the design helicopter.

c. Gradients. The recommended gradients for a TLOF range from a minimum of 0.5 percent to a maximum of 2.0 percent.

57. ROOF TOP HELIPORTS. Roof top heliport TLOFs may be constructed of wood, metal, or concrete. Elevator penthouses, cooling towers, exhaust/fresh air vents, and other raised features impact roof top helicopter operations. To the extent practical, the TLOF of a roof top heliport should be elevated above the level of any obstacle in the FATO. Other objects or structures should be outside the FATO to permit at least one clear approach/takeoff path aligned with the prevailing winds. Figure 5-2 illustrates this recommendation. Elevated platforms should be designed to support 1.5 times the maximum takeoff weight of the design helicopter. When the TLOF is on a platform elevated more than 30 inches (75 cm) above its surroundings, a 5 foot (1.5 m) wide safety net or shelf should be provided. The safety net or shelf should have a load carrying capability of 25 pounds per square foot (122 Kg per sq. m). The net or shelf, as illustrated in figure 5-3, should not project more than 2 inches (5 m) above the level of the TLOF. A report, Structural Design Guidelines for Heliports, (Report Number AD-A148967) is available from the National Technical Information Service, Springfield, VA 22161.

58. APPROACH/TAKEOFF SURFACE.

a. Approach/Takeoff Path. A hospital heliport must have a at least one approach/takeoff path. This path, to the extent practical, should be aligned with the dominate winds. Two approach/takeoff paths, oriented to be 90 to 180 degrees apart, will minimize the times when the helicopter would have to land or takeoff with a crosswind or tailwind. Approach/takeoff paths may curve to avoid objects and/or noise sensitive areas and utilize the airspace above public lands e.g. freeways, rivers, etc.

b. Approach/Takeoff Surface. An approach/ takeoff surface is centered on each approach/takeoff path and should conform to the dimensions of the FAR Part 77 heliport approach surface. Figure 1-6 illustrates the heliport approach surface which should be free of object penetrations.

c. Approach Protection. It is recommended that as much of the approach/takeoff surface as circumstances permit overlay hospital property.

59. HELICOPTER PARKING. A separate helicopter parking area is required at heliports that will accommodate more than one helicopter at a time. Helicopter parking areas should not lie under an approach/takeoff surface.

60. HELIPORT MARKERS AND MARKINGS. Markers and/or surface markings are recommended to define the perimeters of the FATO and TLOF surfaces and to identify the facility as a hospital heliport. Surface markings may be paint or preformed material.

a. Perimeter Markings. The perimeter of the FATO and/or the TLOF should be defined with in-ground markers and/or surface markings. When the TLOF edges are obvious, such as a paved TLOF in a turf FATO, perimeter markings may not be required.

(1) Unpaved Surfaces. The perimeter of an turf FATO should be identified with in-ground markers that will not catch helicopter skids or create barriers to helicopter maneuvering. If raised markers are used, they should be located at the outer edges of the safety area and be no more than 8 inches (20 cm) in height. Markers are placed at the corners and as needed along the edges of the FATO. Figure 5-4 illustrates different types of in-ground and raised markers.

(2) Paved Surfaces. A 12 inch (30 cm) wide dashed white line defines the FATO perimeter. The segments and separation between segments should be even. The corners must be defined and the edge segments should be approximately 5 feet (1.5 m) in length. A 12 inch (30 cm) wide white line defines the perimeter of a TLOF. These lines are illustrated in figure 5-4.

b. Identification Marking. A hospital heliport is identified by a red capital letter H centered on a white cross. The recommended maximum dimensions of the cross is 30 feet (9 m) by 30 feet (9 m) as illustrated in figure 5-4 and more fully described in appendix 2. The red H is centered in the cross with the H oriented to align with the preferred direction of approach. To enhance the cross symbol conspicuity in areas subject to snow, the pavement between the cross and the white TLOF perimeter line may be solid red.

c. Closed Heliport. All markings of a permanently closed hospital heliport should be obliterated. If obliteration is impractical, a yellow X, as illustrated in figure 5-5, should be placed over the existing markings. The X must be large enough to ensure early pilot recognition.

61. HELIPORT LIGHTING. Because ambient lighting is usually inadequate, the landing area and the wind indicator (sock) should be lighted for night operations.

a. Perimeter Lights. At least 3 uniformly spaced lights are recommended per side of a square or rectangular FATO or TLOF with a light located at each corner. A minimum of eight lights are needed to define a circular FATO or TLOF. The interval between lights should not exceed 25 feet (7.5 m).

(1) FATOs. Flush lights may be located on, or within 1 foot (30 cm) of, the FATO edge. Raised light fixtures, modified to be no more than 8 inches (20 cm) in height, should be located 10 feet (3 m) out from the edge of the FATO.

(2) TLOFs. Flush lights may be located on, or within 1 foot (30 cm) of, the TLOF edge. Raised light fixtures, modified to be no more than 8 inches (20 cm) in height, may be located 10 feet (3 m) out from the TLOF edge and should not penetrate a horizontal plane at the TLOF's elevation by more than 2 inches (5 cm). Figure 5-6 illustrates hospital heliport lighting.

(3) Raised TLOFs. Flush lights may be placed within 1 foot (30 cm) of the edge of a raised TLOF. Raised fixtures are illustrated in figure 5-7. In snow areas, it is suggested that the lights be placed along the outer edge of the safety net or shelf.

b. Floodlights. Floodlights may be used to illuminate the heliport. To eliminate the need for tall poles, these floodlights may be mounted on an adjacent building. Care should be taken, however, to place floodlights clear of the safety area, the approach/takeoff surface(s), and the heliport transitional surfaces. Floodlights should be aimed down and provide a minimum of 3 foot candles (32 lux) of illumination over the heliport surface. Floodlights which might interfere with pilot vision during takeoff and landings must be capable of being turned off during landings and takeoffs.

c. Heliport Beacon. A beacon may not be necessary when the location of the hospital can be readily determined by the lighting on a prominent building or landmark near the heliport. When a beacon is provided, it should be located on the highest point on the roof of the hospital. Beacons should conform to AC 150/5345-12, Specification for Airport and Heliport Beacon.

d. Wire Marking. Where practical, it is recommended that unshielded electric and telephone wires located within 500 feet (150 m) of the FATO, as well as those within 1/2 mile (1 km) that are beneath and up to 100 feet (30 m) to the side of an approach/takeoff path be marked to make them more conspicuous. Figure 5-8, illustrates the area that should be considered for marking and/or lighting. Guidance on marking and lighting objects is contained in AC 70/7460-1, Obstruction Marking and Lighting.

62. WIND DIRECTION INDICATOR. A hospital heliport must have at least one wind indicator. A wind sock is the preferred indicator as it shows both the direction and magnitude of the wind. The wind sock should be placed where it provides a true indication of surface wind and clear of the safety area and the approach/takeoff surface(s). The wind sock may be internally or externally lighted for night operations, or, alternatively be located in an illuminated area.

63. MAGNETIC RESONANCE IMAGERS (MRI). Hospital equipment, such as an MRI used in diagnostic work, can create a strong magnetic field which will cause temporary aberrations in the helicopter's magnetic compass and may interfere with other navigational systems. Heliport proponents should be alert to the location of any Magnetic Resonance Imagers (MRI) with respect to the heliports location. A warning sign alerting pilots to the presence of an MRI is recommended. Verbal warning that the MRI is operating should be given in radio contacts with an approaching EMS helicopter.

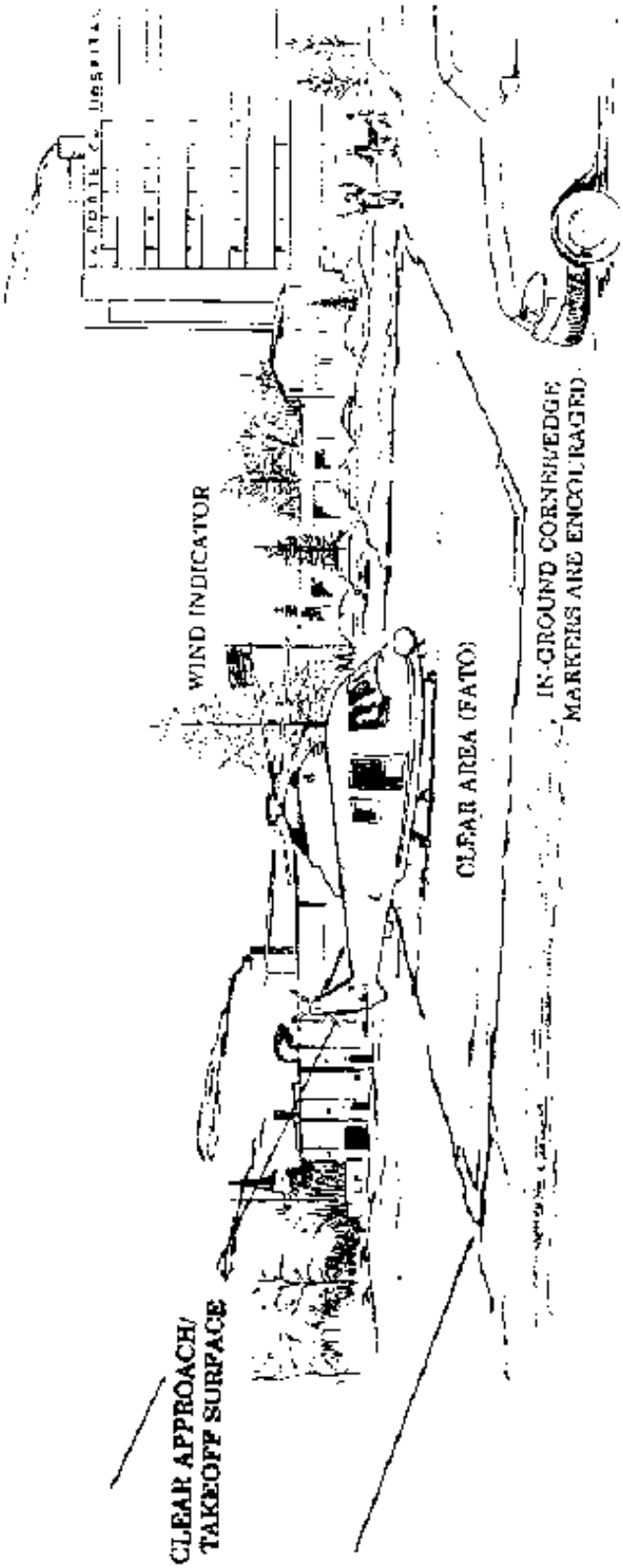


Figure 5-1. A basic hospital heliport

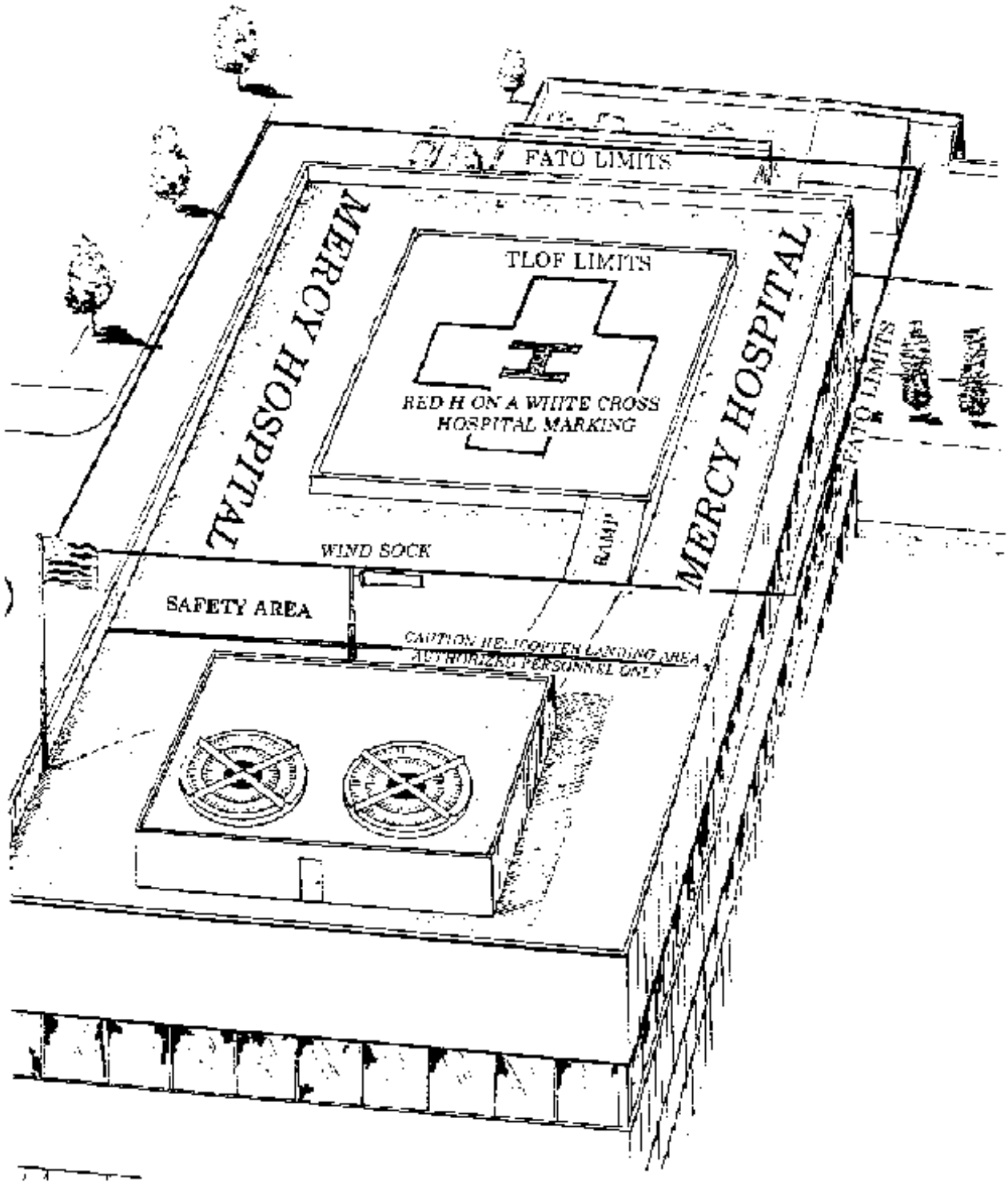


Figure 5-2. A roof top hospital heliport

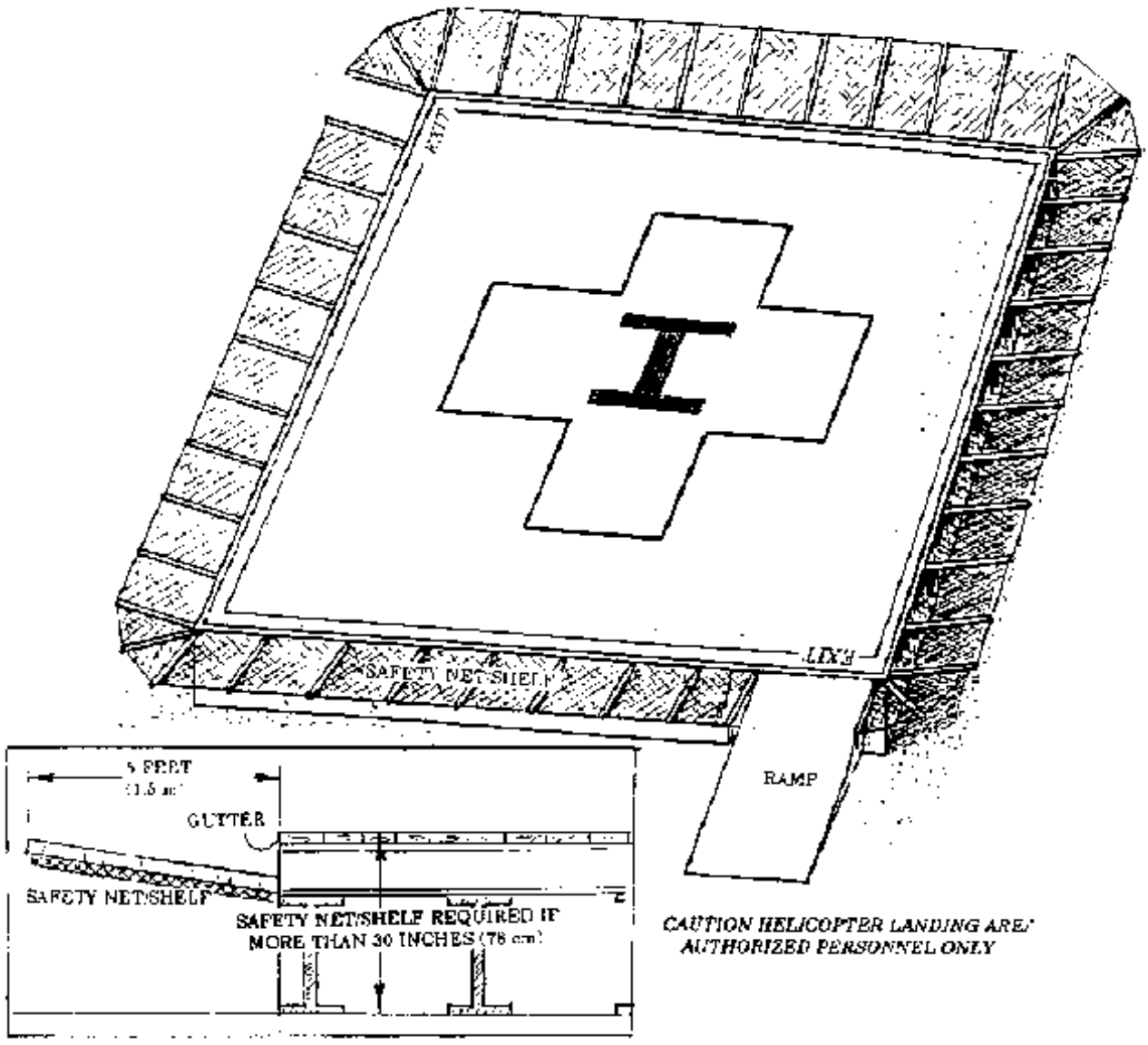


Figure 5-3. Elevated TLOF and safety net

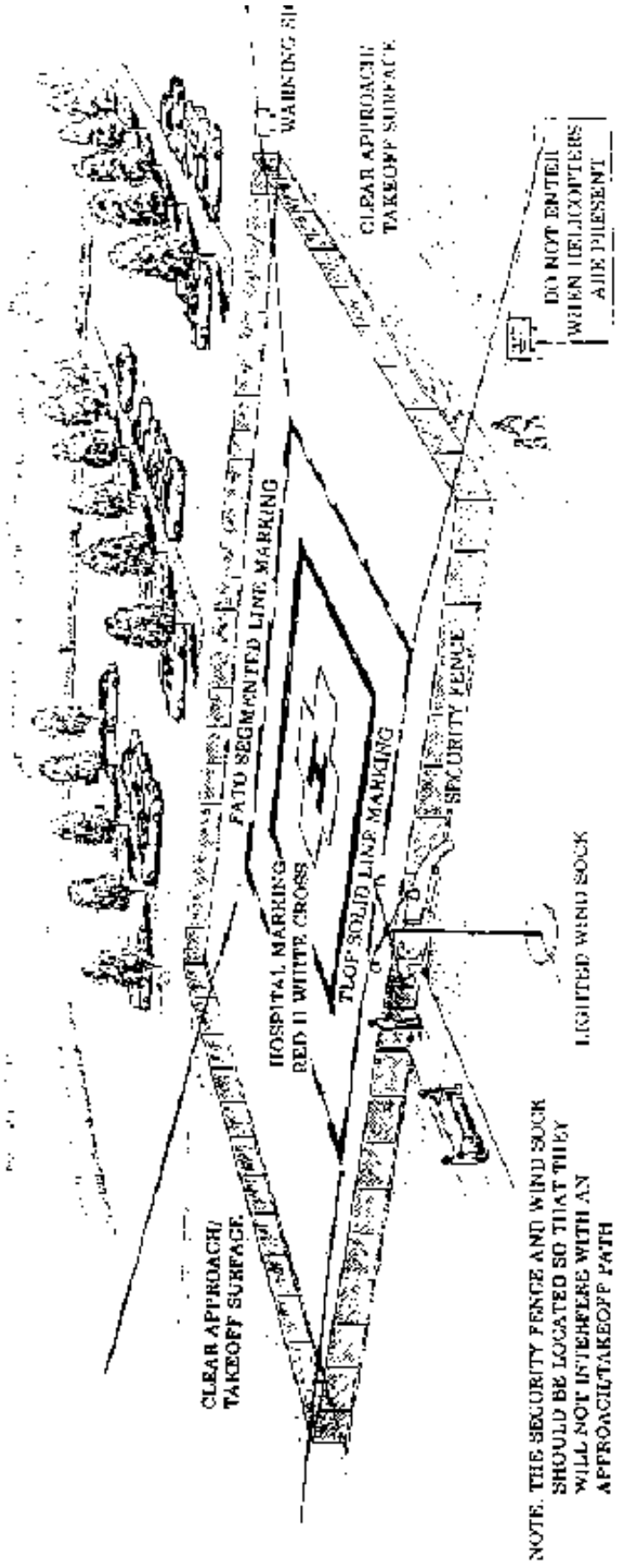


Figure 5-4. Hospital heliport markings

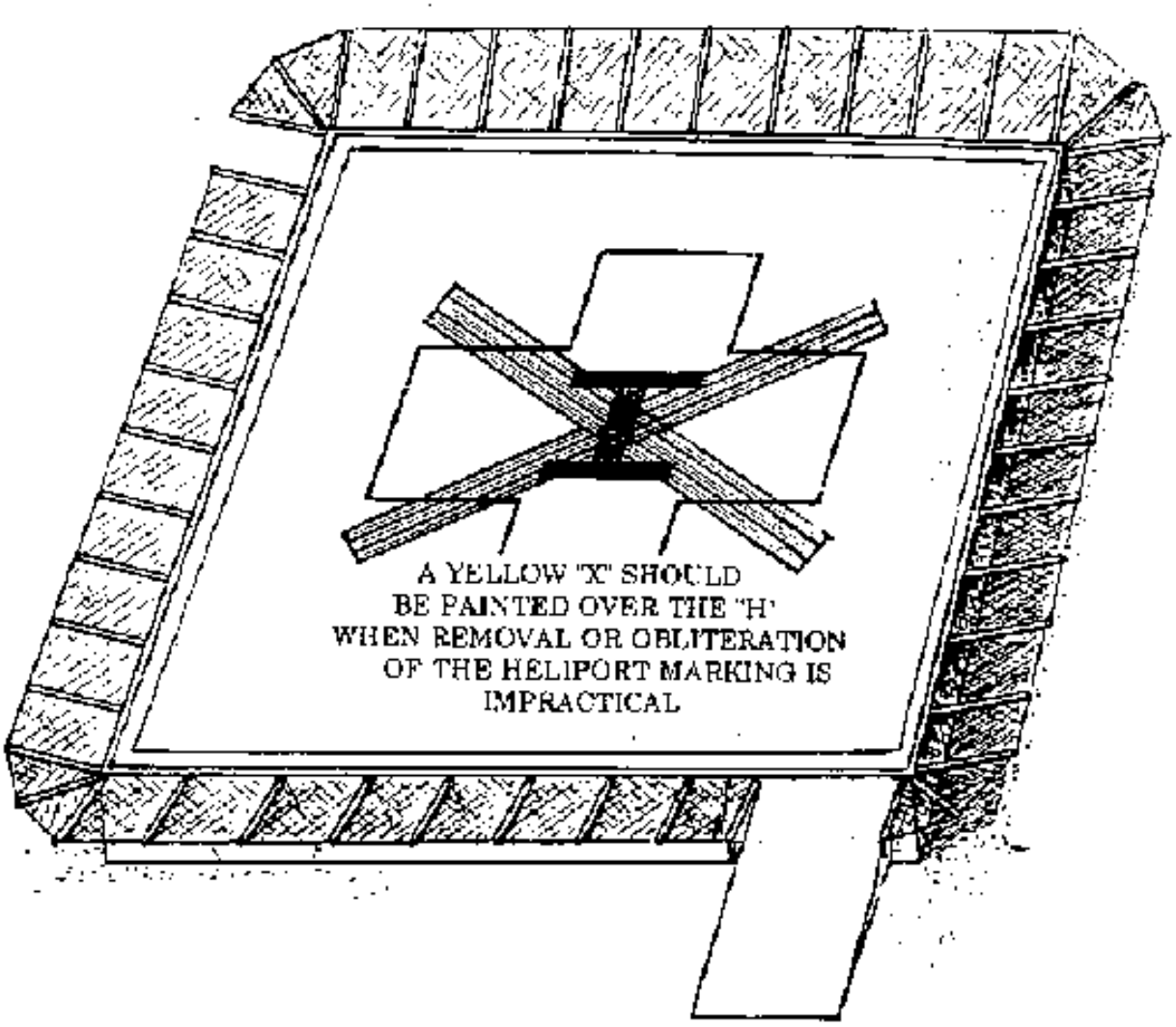


Figure 5-5. A closed hospital heliport

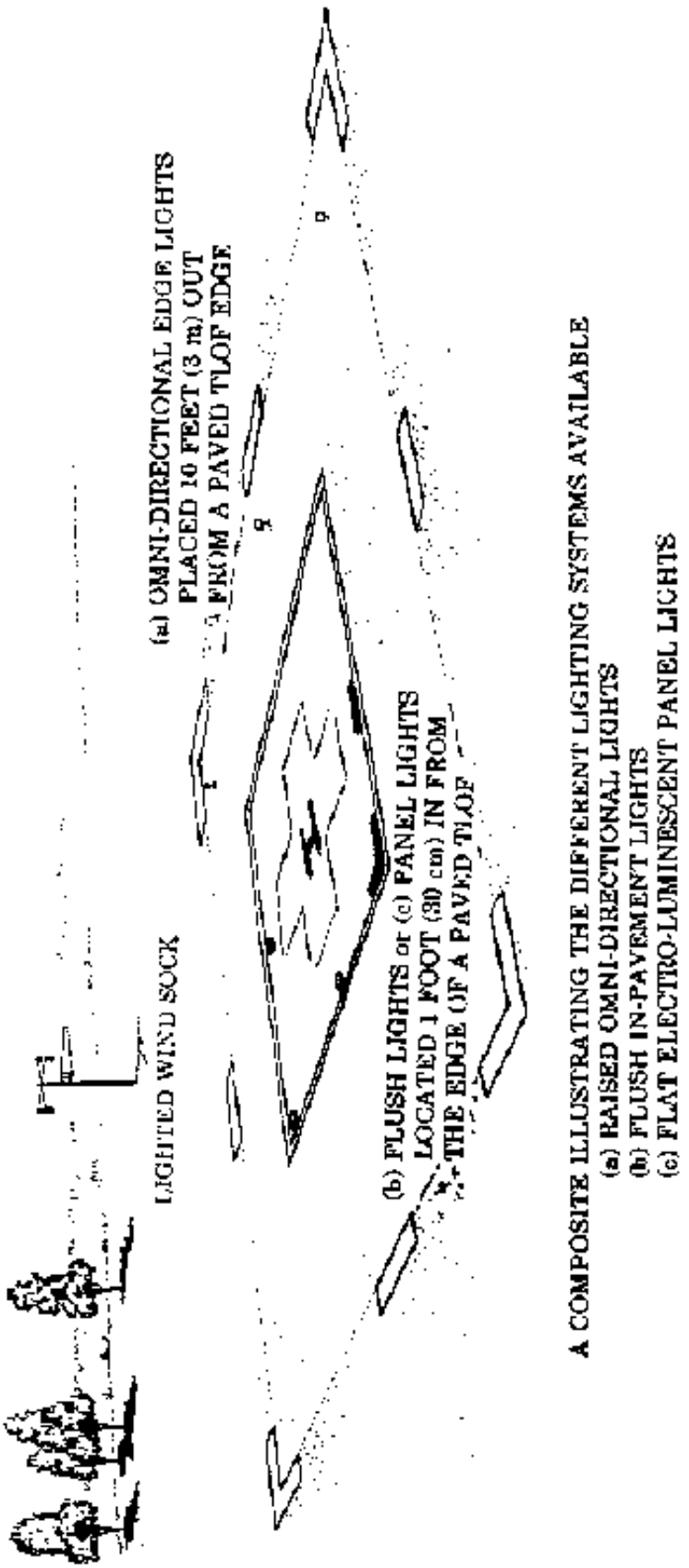
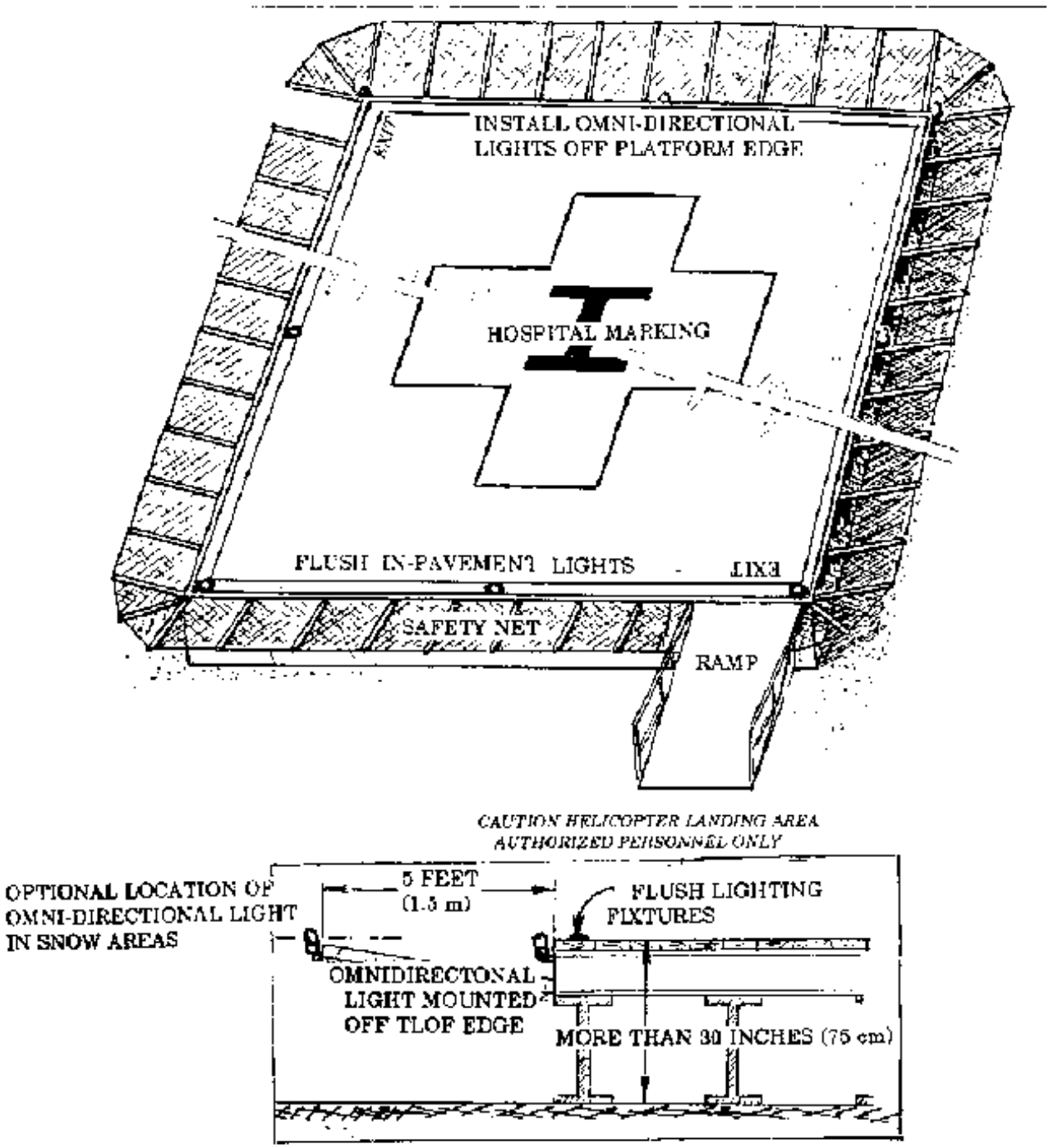


Figure 5-6. Hospital heliport lighting



EDGE LIGHTING DETAILS

Figure 5-7. Raised platform lighting

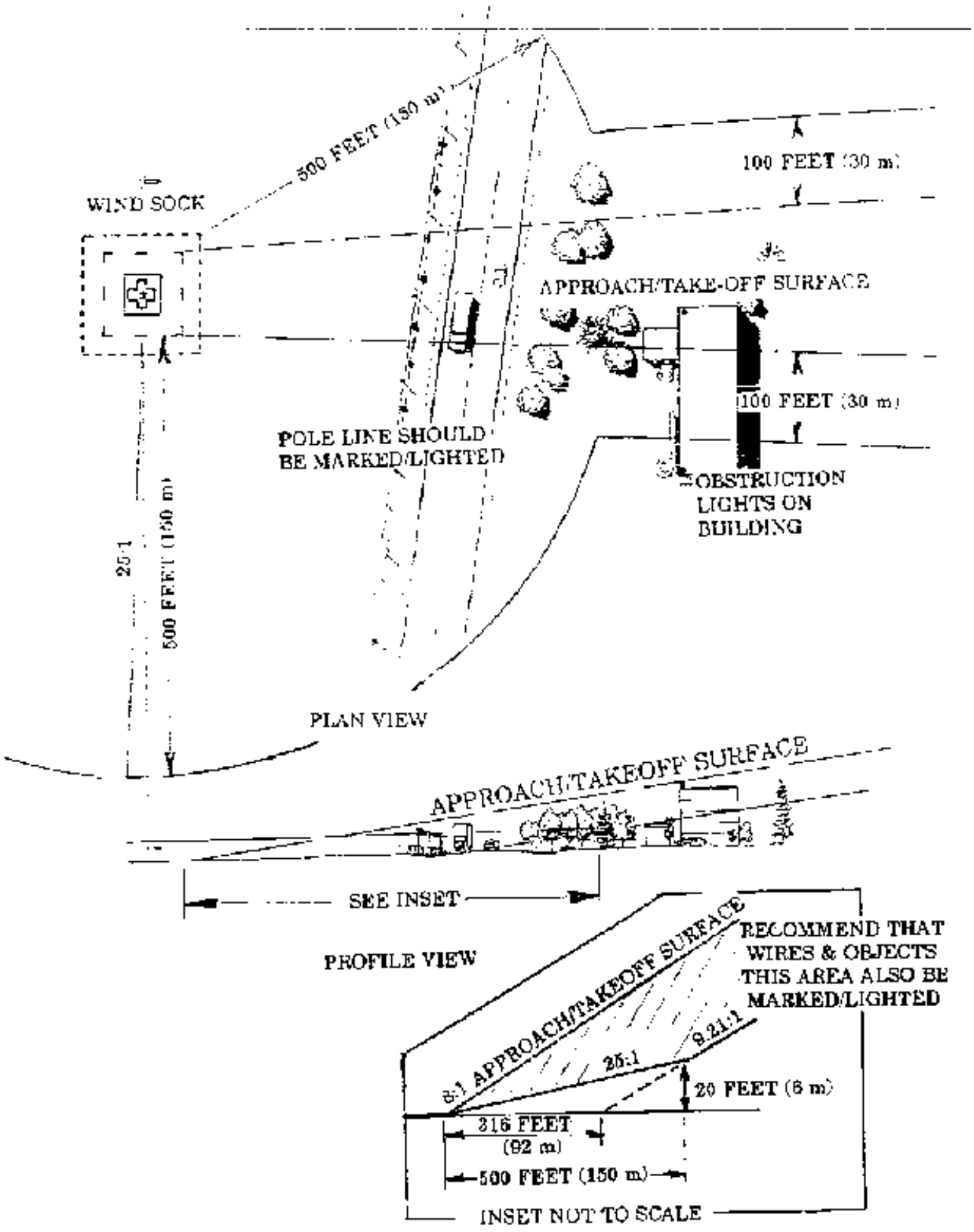


Figure 5-8. Recommended area for wire marking and/or lighting

CHAPTER 6. HELICOPTER FACILITIES ON AIRPORTS

64. GENERAL. Helicopters are able to operate on most airports without unduly interfering with airplane traffic. Separate facilities and approach/takeoff procedures may be necessary when the volume of airplane and/or helicopter traffic impacts operations. At airports with inter-connecting passenger traffic, the terminal apron should provide gates for helicopter boardings. Persons who use a helicopter to go to an airport generally require convenient access to the airport terminal and services provided airplane passengers. The airport layout plan (ALP) should be amended or revised to identify the location of the exclusive use helicopter facilities, approach/takeoff paths, and helicopter taxi routes. This chapter addresses design considerations for providing separate helicopter facilities on airports.

65. TAKEOFF AND LANDING SURFACES. The area(s) developed/designated for helicopter landings and takeoffs may be located anywhere on the airport. The takeoff/landing area should provide for ready access to the airport terminal or to the helicopter users origin or destination.

a. FATOs/TLOFs. FATO/TLOF dimensions and clearances in chapters 3 and 4 also apply to facilities being developed on an airport for helicopter usage.

b. Approach/Takeoff Paths. Each FATO/TLOF must have at least one approach/takeoff path meeting the criteria in chapters 3 and 4. To the extent practical, helicopter approach/takeoff paths should be independent of approaches to active runways.

c. Spacing Criteria. The recommended distance between the centerline of an approach to a runway and the centerline of an approach to a FATO for simultaneous same direction VFR operations is provided in table 6-1.

d. Marking and Lighting. The marking and lighting systems of chapters 3 and 4 also apply to airport helicopter facilities. When the FATO or TLOF is located on an existing paved area, such as an apron or taxiway traversed by airplanes, all markings and lighting fixtures defining the FATO and TLOF, and taxi route centerlines or limits should be flush with the pavement as illustrated in figure 6-1.

66. SURFACE MOVEMENT. Helicopter taxiways and taxi lanes should conform to the criteria of chapter 3 or 4. Paved taxiways permit wheel equipped helicopters to ground maneuver. When taxi distances are great, both wheel and skid equipped helicopters can be expected to hover or air taxi.

a. Hover Taxiing. The cylindrical markers illustrated in figure 6-2 are recommended to define the edges of a route for helicopters hover taxiing. Hover taxi routes should meet the appropriate clearance requirements and be located to minimize interaction with airplane operations. The cylindrical markers displaying 3 equal width bands of yellow-blue-yellow define hover taxi route edges. Markers are placed at intervals not in excess of 100 feet (30 m) on straight sections and 50 feet (15 m) on curved sections.

b. Air Taxiing. Air taxiing at elevations approximately 100 feet (30 m) above the surface is preferred when helicopters must traverse long distances. The large markers illustrated in figure 6-2 may be used to define the centerline when air taxiing 100 feet (30 m) above ground level and should avoid or minimize interaction with airplane operations. Markers are placed at intervals not in excess of 200 feet (60 m) on straight sections and 100 feet (30 m) on curved sections.

Table 6-1. Distance between FATO center to runway centerline

	Small Helicopter 6,000 lbs or less	Medium Helicopter 12,000 lbs or less	Heavy Helicopter over 12,000 lbs
Small Airplane 12,500 lbs or less	300 feet 90 m	500 feet 150 m	700 feet 210 m
Large Airplane 12,000 lbs to 300,000 lbs	500 feet 150 m	500 feet 150 m	700 feet 210 m
Heavy Airplane Over 300,000 lbs	700 feet 210 m	700 feet 210 m	700 feet 210 m

c. Parking Positions. Helicopter parking positions should be located as close to the intended destination or origination of the passengers as conditions permit. Clearances should conform with the apron design and marking criteria of chapters 3 or 4. Locate parking positions to minimize helicopter rotor wash from upsetting parked airplanes.

d. Passenger Walkways. Passenger movement in operational areas should be restricted to marked walkways. Figure 4-15 illustrates one marking scheme. Apron pavements should be designed so that spilled fuel does not drain onto passenger walkways or toward parked helicopters.

67. PASSENGER SERVICES. Unless screening was carried out at the helicopter passengers departure location, Federal Aviation Regulations require that a screening area and/or screening be provided before passengers enter the airport's secured areas. Multiple helicopter parking positions and/or locations may be needed in the terminal area to service helicopter passenger and/or cargo inter-line connecting needs.

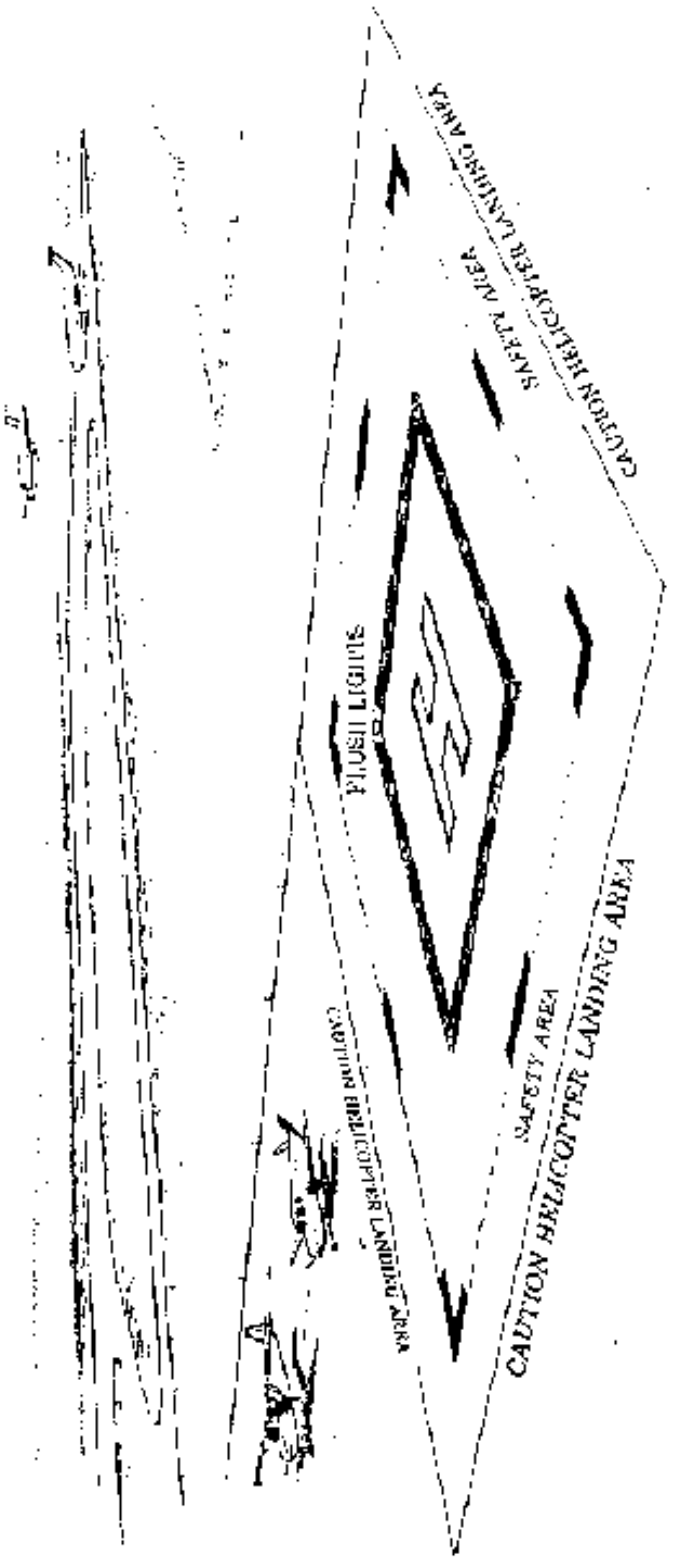
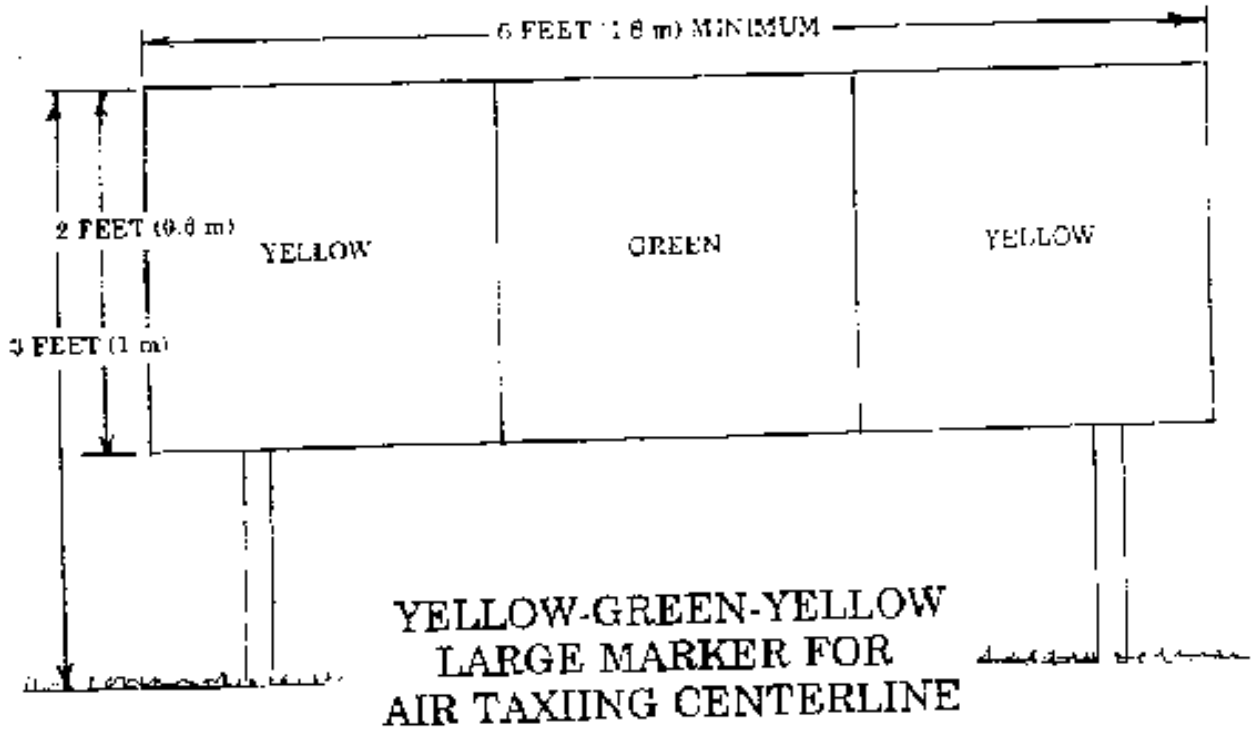


Figure 6-1. Apron TOLF



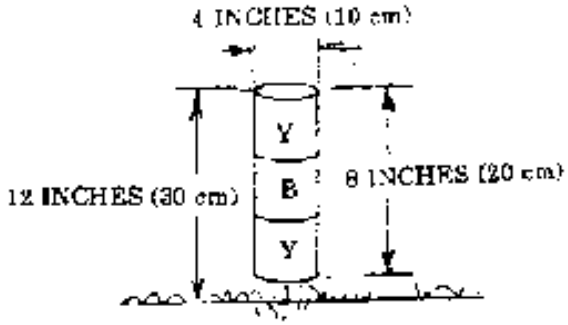


Figure 6-2. Large and cylindrical markers for helicopter air taxiing and hover taxiing at airports

CHAPTER 7. NON-PRECISION INSTRUMENT OPERATIONS

68. GENERAL. A non-precision approach procedure permits helicopter operations to continue during periods of reduced visibility. The procedure is based on signals providing bearing and distance information. The signals are broadcast from navigational aids such as a Very High Frequency Omni-range (VOR) transmitter located at some distance from the heliport. The non-precision procedure is established in accordance with Order 8260.3, United States Standard for Terminal Instrument Procedures (TERPS). To achieve lower minimums, the following criteria for the improved lighting system and increased airspace is recommended. This chapter addresses issues which heliport owners should consider before requesting the development of a non-precision approach procedure.

69. IMPROVED LIGHTING SYSTEM. The enhanced perimeter lighting system and the Heliport Instrument Lighting System (HILS), illustrated in figure 7-1, are recommended.

a. Perimeter Light Enhancement. An additional light is inserted between each light in the front and rear row of perimeter lights to enhance the definition of the TLOF.

b. HILS Lights. Three unidirectional PAR 56, 200 watt aimed lights (edge bars) extending the right and left line of perimeter lights fore and aft and the front and rear line of perimeter lights right and left.

(1) Edge Bars. Edge bar lights are spaced at 50 foot (12.5 m) intervals, measured from the front and rear row of perimeter lights.

(2) Wing Bars. Wing bar lights are spaced at 15 foot (4.5 m) intervals, measured from the line of perimeter edge (side) lights.

c. Optional Lights. An optional feature is a line of 7 white flush lights spaced at 5 foot (1.5 m) intervals installed in the TLOF pavement. The lights are aligned on the centerline of the approach course to provide close in directional guidance and improve TLOF surface definition.

70. OBSTACLE EVALUATION SURFACES. The following surfaces are evaluated for object penetrations when the improved lighting system is provided for lower minimums. Figure 7-2 illustrates these surfaces.

a. Approach Surface. The approach surface is a trapezoidally shaped plane starting at the end and elevation of the FATO. The surface is wider than the recommended FATO. It begins at a width of 500 feet (150 m) and flares outward to a width of 5,000 feet (1 500 m) in a horizontal distance of 10,000 feet (3 000 m). The surface slopes upward at a ratio of 20:1 (horizontal to vertical).

b. Transitional Surfaces. Transitional surfaces extend outward and upward from the edges of the FATO and the non-precision approach. Transitional surfaces slope upward at a ratio of 4:1 (horizontal to vertical).

(1) FATO transitional surfaces terminate in a horizontal distance of 350 feet (105 m) measured from the edges of the FATO.

(2) Approach/takeoff transitional surfaces terminate in a horizontal distance of 600 feet (180 m) measured from the centerline of the approach/takeoff surface.

c. Missed Approach Surfaces. All instrument procedures require a missed approach procedure. The surfaces for a missed approach procedure may continue in the direction of the approach or incorporate a turn. Missed approach surfaces are complex and need to be discussed with an FAA airspace procedures specialist early in the effort.

NOTE: *Non-precision instrument approach procedures utilizing Loran C and/or Global Positioning System (GPS) signals are being evaluated. The imaginary surfaces to be evaluated for penetrating objects may differ from the imaginary surfaces described herein.*

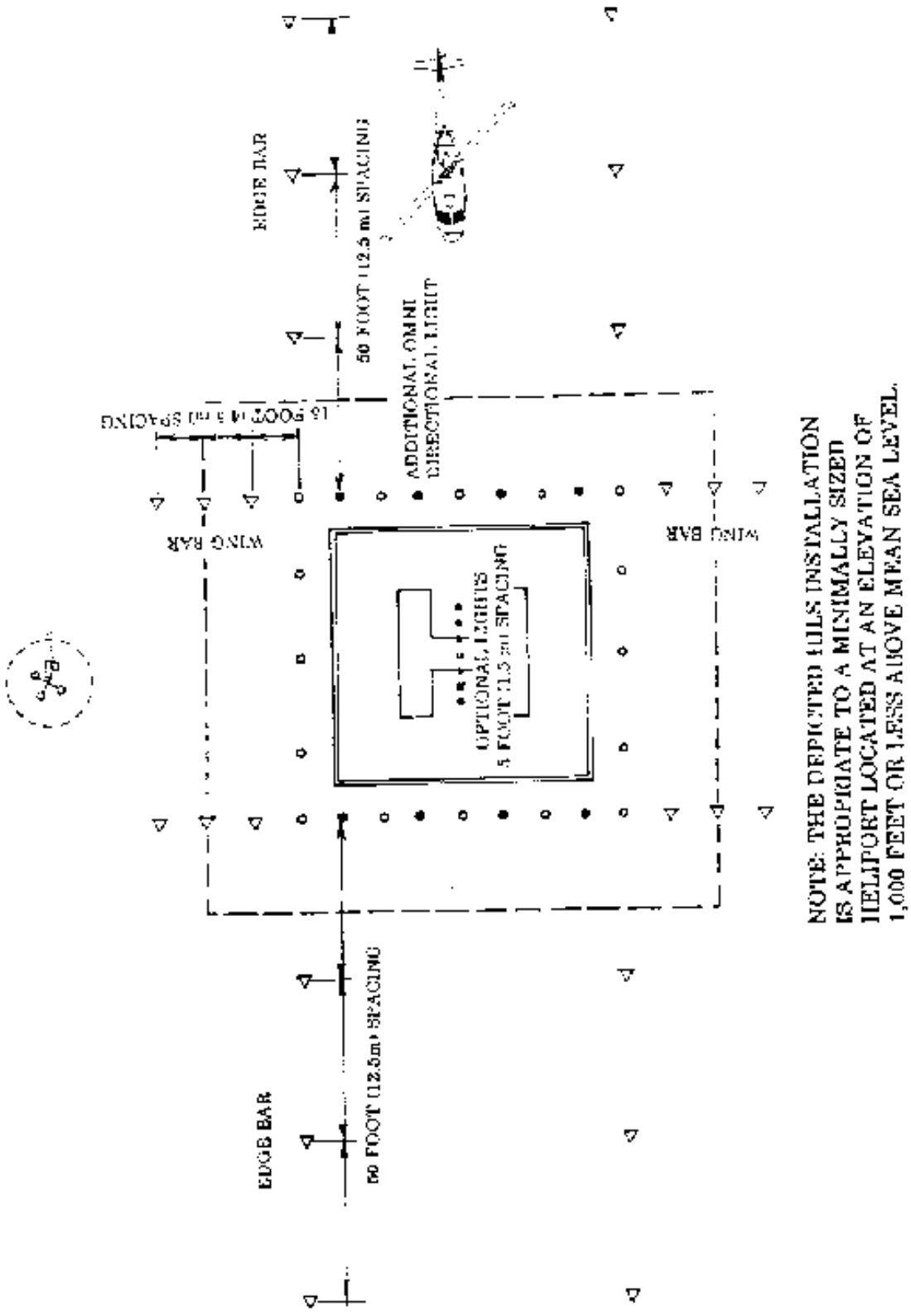


Figure 7-1. Heliport instrument lighting system (HILS)

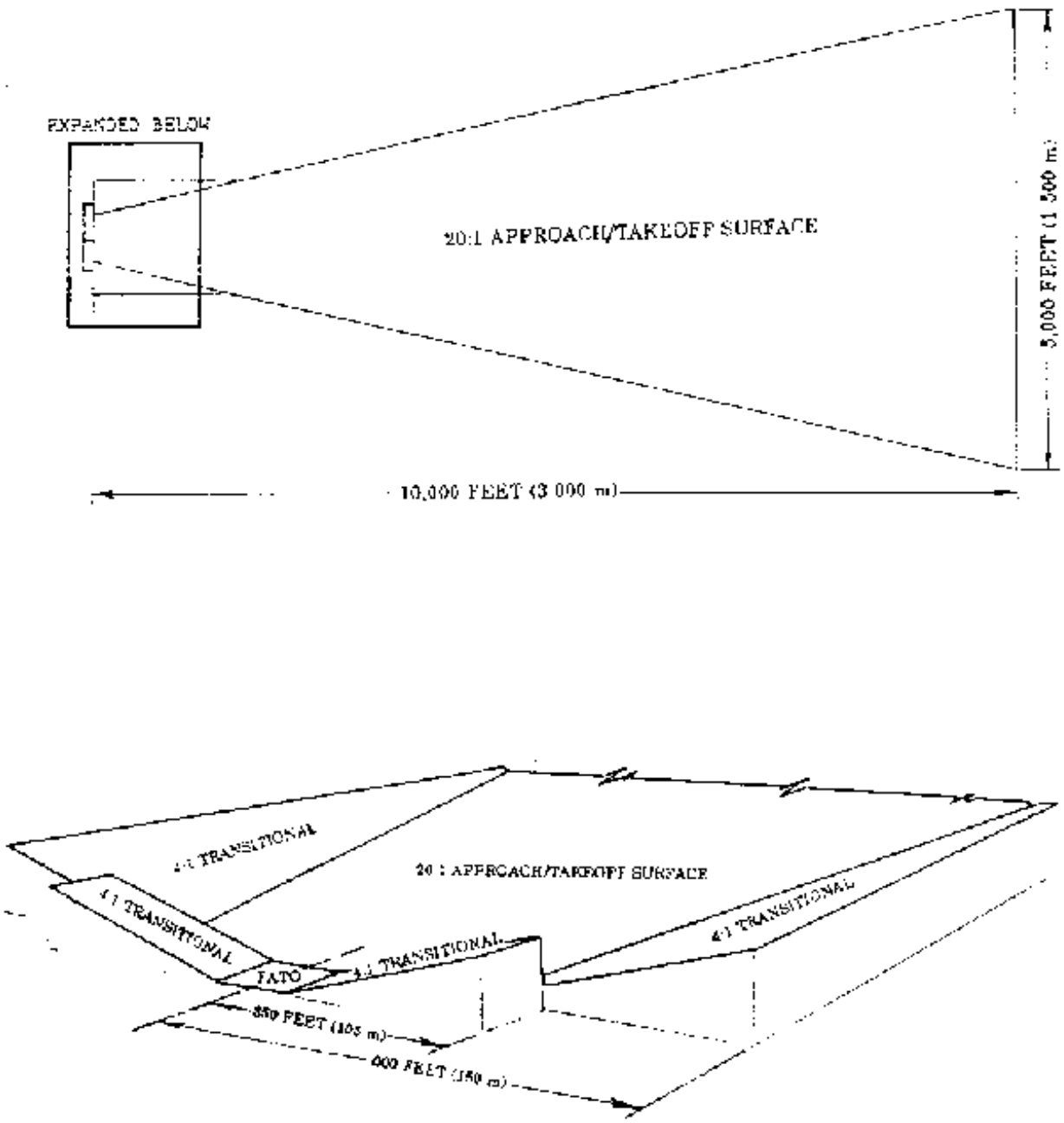


Figure 7-2. Obstacle evaluation surfaces

CHAPTER 8. PRECISION APPROACH OPERATIONS

71. GENERAL. A precision instrument approach procedure is necessary to provide the operational capability desired by many executive and corporate users. Such a procedure is established in accordance with Order 8260.3, United States Standard for Terminal Instrument Procedures (TERPS), and is essential to assure the all-weather reliability needed for a helicopter air carrier to be successful in offering scheduled service. This chapter describes the larger ground area (FATO) associated with precision instrument operations and describes the imaginary aerial surfaces which are evaluated for the impact of object penetrations. Heliport owners desiring a precision instrument approach procedure are urged to initiate early contact with the appropriate FAA Regional Office.

72. FINAL APPROACH REFERENCE AREA (FARA). A certified helicopter precision approach procedure terminates in the helicopter coming to a hover or touching down within a 150 foot (45 m) wide by at least 150 feet (45 m) long FARA. The FARA is located at the far end of a 300 foot wide by 1,225 foot long (90 m by 373 m) FATO required for a precision instrument procedure. Figure 8-1 illustrates the FARA/FATO relationship.

73. LIGHTING REQUIREMENTS. The following lighting systems are necessary for a helicopter precision instrument approach procedure with the lowest minimums.

a. HALS. The HALS installation, depicted in figure 8-2, is a distinctive approach lighting configuration designed to prevent it from being mistaken for an airport runway approach lighting system.

b. Enhanced Perimeter Lighting System. The enhanced perimeter lighting system, as described in chapter 8, strengthens the conspicuity of the front and back line of perimeter edge lights.

c. HILS. The HILS system, described in chapter 8, uses PAR-56 lights to extend the line of edge lights fore and aft and right and left.

NOTE: *Figure 8-3 depicts the HILS and HALS precision instrument approach lighting system installation at the FAA's Demonstration Heliport, Atlantic City, New Jersey. The FAA is continuing its study of configurations for precision instrument approach lighting systems.*

74. OBSTACLE EVALUATION SURFACES. The operational minimums, determined by the FAA in establishing a helicopter precision approach procedure, depend upon the extent that objects or structures penetrate the surfaces described below and depicted in figure 8-4. The FAA needs to know the location and elevations of objects that penetrate the described surfaces to advise the heliport owner as to the lowest practical approach angle and prospective operational minimums. The heliport owner must then judge whether the operational benefits of the lower approach angles justify the costs to remove, lower, or mark and light objects and structures impacting the procedure.

a. Approach Surface. A precision approach surface is a trapezoidally shaped plane beginning at the near edge of the instrument FATO. The trapezoid extending outward for 25,000 feet (7 500 m) in the direction of the approach has an initial width of 1,000 feet (300 m) and flares to a width of 6,000 feet (1 800 m) at the far end. The vertical slope ratio of 34:1 (horizontal to vertical) depicted in figure 8-4 is required for a 3-degree glide slope approach angle. A vertical slope ratio of 22.7:1 is required for a 4.5 degree glide slope approach angle. A vertical slope ratio of 17:1 is required for a 6 degree glide slope approach angle. The glide slope approach angle can vary in increments of 1/10 degree from 3 degrees up to 6 degrees with corresponding adjustments to the vertical slope ratio and landing minimums.

b. Transitional Surfaces. A precision instrument approach has transitional surfaces associated with the instrument FATO and the certified approach surface.

(1) FATO. Inner transitional surfaces abut each side, and when there is no back approach, the non- approach end of an instrument FATO. Transitional surfaces are 350 feet (105 m) wide and slope upward at right angles to the centerline of the instrument FATO at a ratio of 7:1 (horizontal to vertical).

(2) Approach Surface. Transitional surfaces abut each edge of the precision approach trapezoid. The surface is 600 feet (180 m) wide at the FATO end and flares to a width of 1,500 feet (450 m) at the far end of the approach trapezoid. Transitional surfaces slope upward at right angles to the centerline of the approach course at a ratio of 7:1 (horizontal to vertical).

c. Missed Approach Surfaces. The ability to support low landing minima, even when the approach trapezoid is void of penetrations, may be controlled by objects in the missed approach segment of the procedure. While figure 8-4 illustrates the initial portion of a missed approach surface, missed approach requirements are complex requiring specific technical advise outside the scope of this AC.

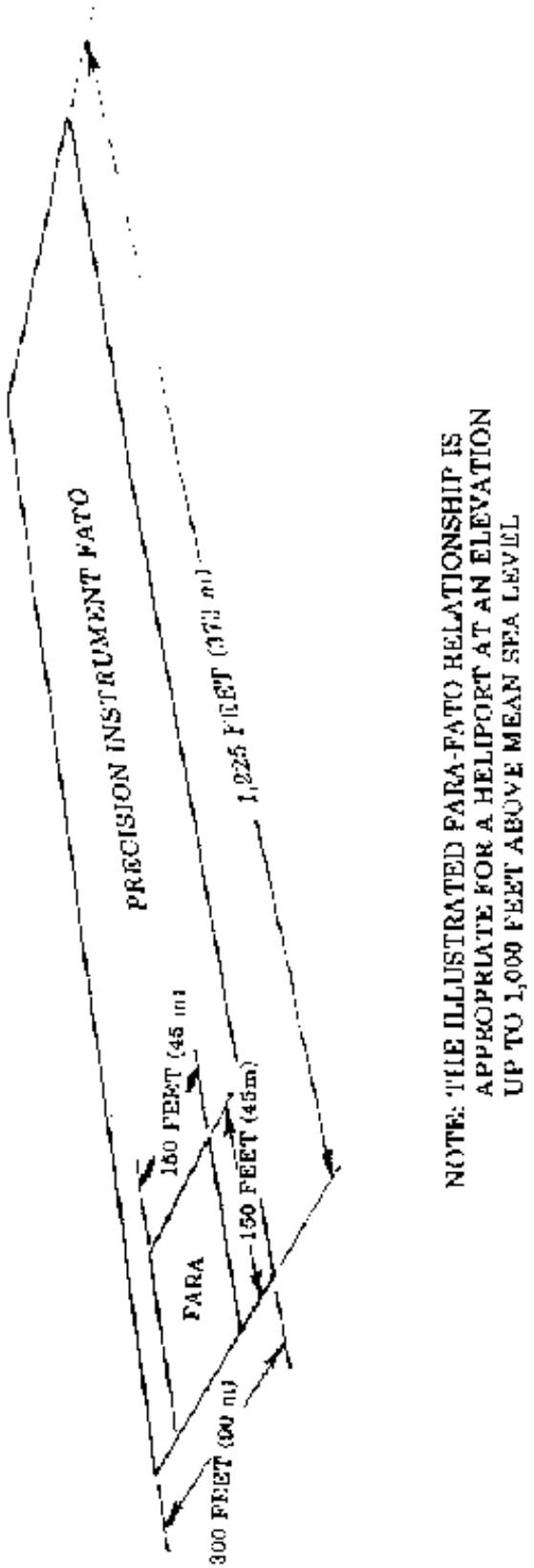


Figure 8-1. FARA/FATO relationship

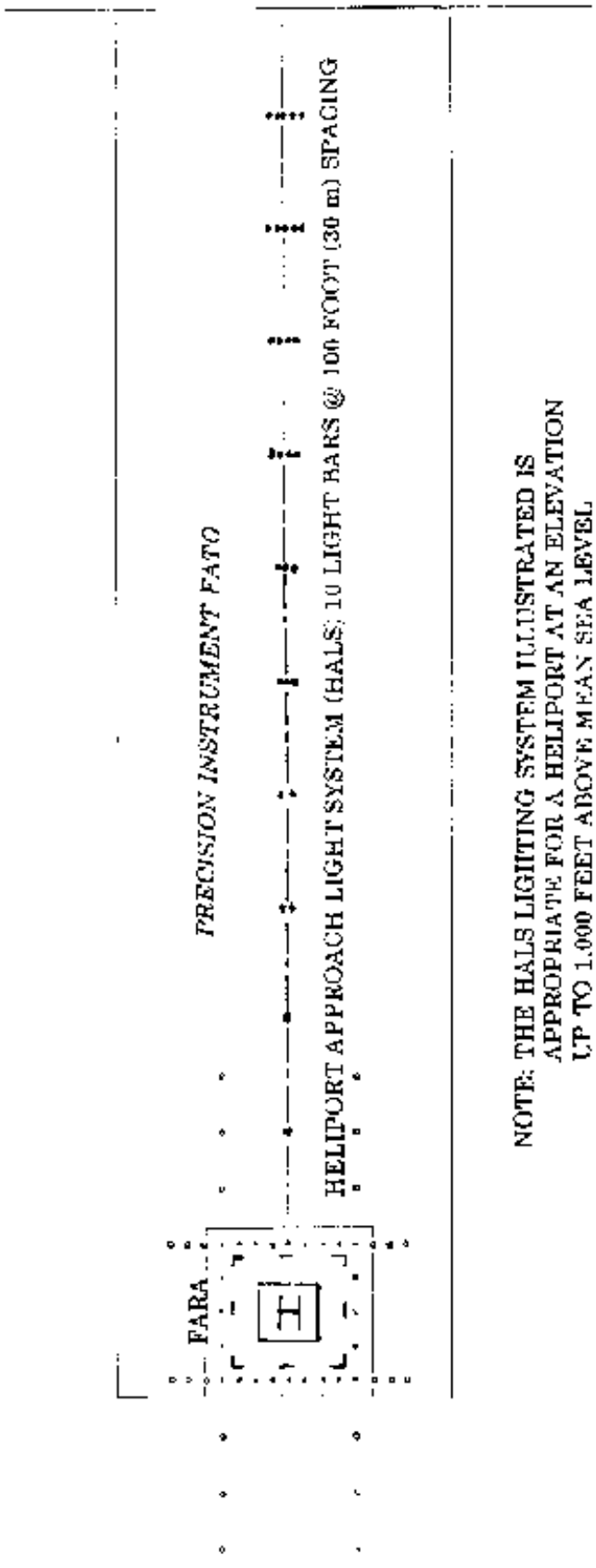


Figure 8-2. HALS lighting system.

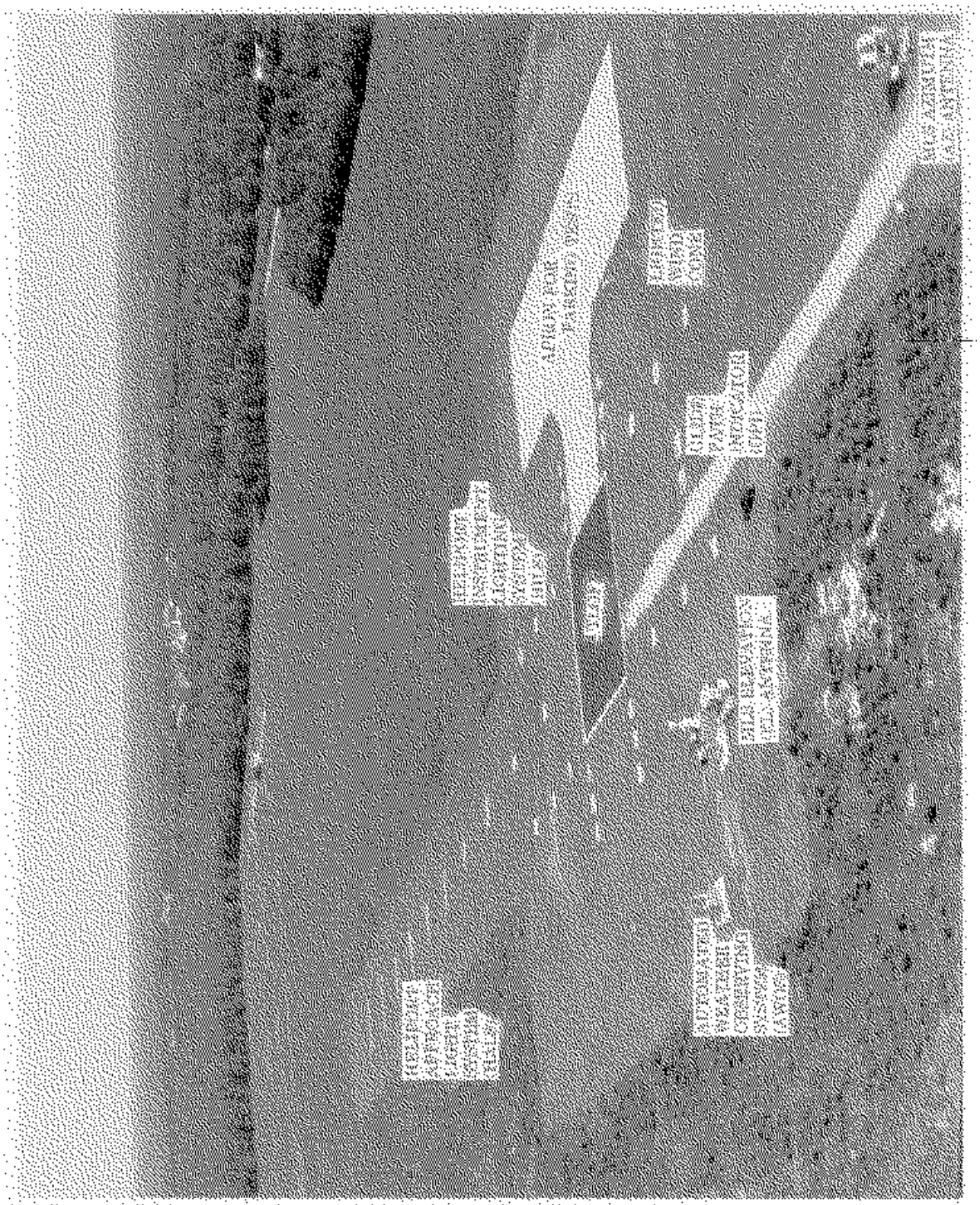


Figure 8-3. FAA Demonstration Heliport

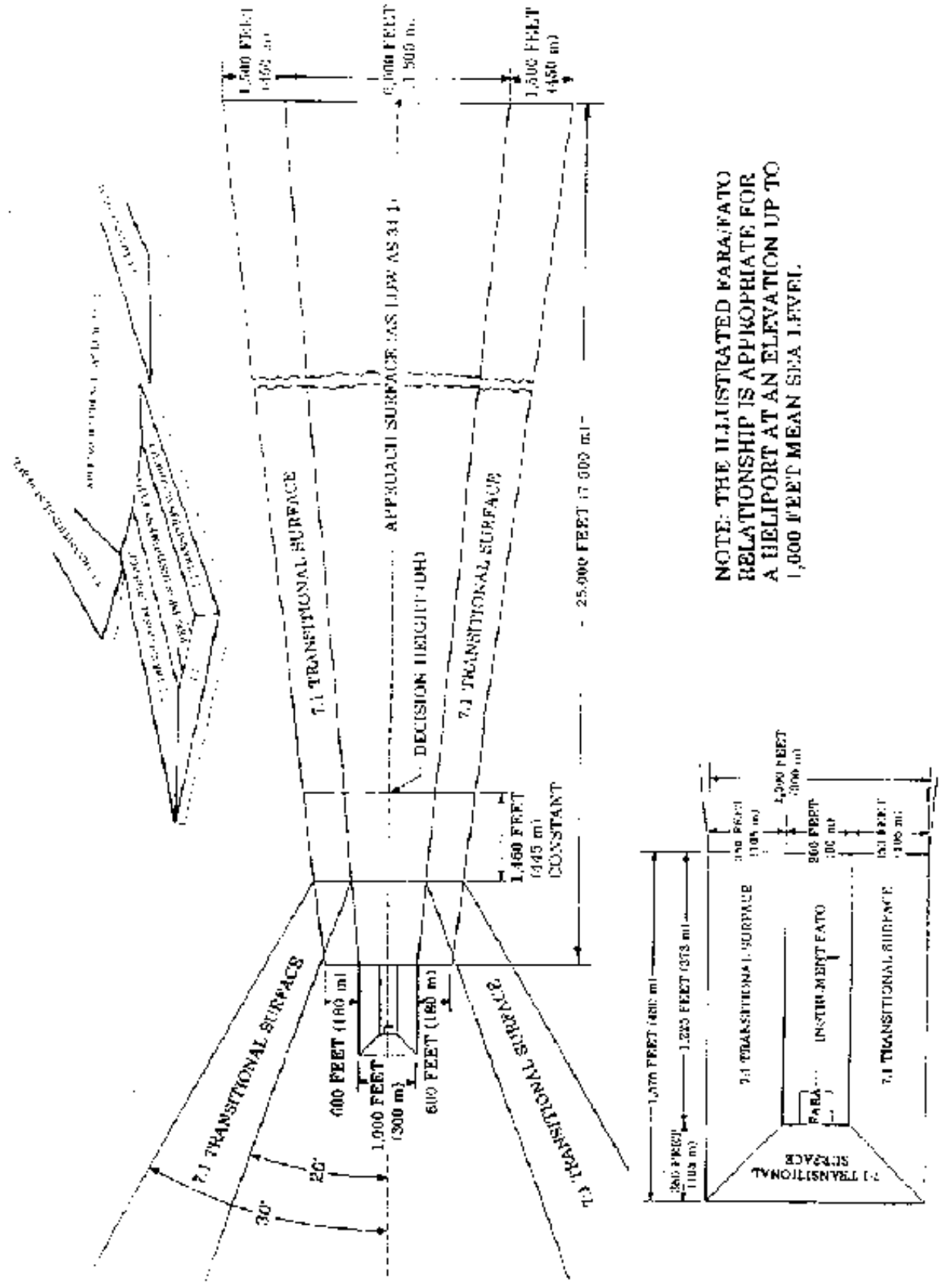


Figure 8-4. Obstacle evaluation surfaces